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NORTHEAST ELECTRONICS

Division of northern telecom

Airport Rd., Concord, N.H. 03301•(603) 224-6511•TELEX 94-3453

INSTRUCTION MANUAL

PRINTED IN U.S.A.

2.0C-0086-1077

MODEL 8600

MULTI-PURPOSE TRANSMISSION MEASURING SYSTEM

COVERS: 8610A-CN, 8620, 8630, 8631, 8632
8640, 8641, 8650, 8651

No. A0086-12-600 ISSUE 5 DATE OCT 77

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SECTION 1

GENERAL DESCRIPTION

1.1 The Model 8600 is a time-shared transmission test system that provides fast, accurate measurement service at multiple locations throughout a telephone office. The system can measure:

- ☐ Transmission level . . . from −55 to +14 dBm;
- ☐ Circuit noise (with or without holding tone) . . . from +5 to +74 dBrn;
- ☐ Frequency . . . from 50 Hz to 100 kHz;
- ☐ Pulse signaling speed and percent break.

1.2 The system comprises one **central measurement unit** which is shared by multiple **access units** installed at desired locations in a telephone office. Craft personnel use the system by patching circuits to be tested into any of the access units. Test results are automatically returned to the using craftsmen via small digital **readout units**. Typical system components are pictured in Figure 1−1.

1.4 Time sharing makes the Model 8600 a cost-effective measurement system. Only one measurement unit is required. Yet, this unit provides comprehensive measurement capabilities for many test locations where only simple, low-cost access and readout units need be installed.

1.3 The system is designed with consideration for the specification KS20805 and is an advanced, all-digital replacement for the Western Electric 40B.

1.5 Any number of access units can be connected to the system. They may be located at test boards, carrier bays, line and trunk frames . . . anywhere testing is performed.

1.6 Readout units may be installed with the access units. Or, readouts may be located at central points for viewing from several access unit locations. Readouts are frequently installed at the ends of aisles, for example. Digits on the readouts are easily readable from distances up to 30 feet away.

1.7 Up to 8 craftsmen can use the system at the same time, without interference, and with no waiting for service. The central measurement unit's time-sharing capabilities are so fast that each craftsman feels he has the entire system all to himself. Measurement requests are typically serviced in a fraction of a second. Even if 8 craftsmen request measurements at exactly the same instant, none will wait longer than a few seconds for his measurement results.

1.8 The system continuously updates the measurements at a fast rate to help while aligning or adjusting equipment under test.

1.9 The basic measurement unit is equipped to perform level, C-message noise, and frequency tests. (A 1010-Hz notch filter is included for C-notched noise-with-tone measurements.) Weighting filters for 3-kHz and 15-kHz noise measurements can be added as options at any time desired.

1.10 All measurements are fully autoranging. Measurement results are displayed as digital numbers with automatic polarity (±) indication and decimal point positioning.

1.11 Transmission level test signals are measured with an averaging detection technique. Measurement results are displayed with a resolution of 0.1 dB.

1.12 Noise is measured with a quasi-rms detection technique. Measurement results are displayed with resolution of 1 dB.

1.13 Frequency is measured by direct counting. Display resolution is 1, 10, or 100 Hz automatically selected according to input signal frequency range.

1.14 Optional capabilities can also be included, as needed: (a) for sending standard percent break test pulsing, and (b) for receiving/measuring the percent break and speed of incoming dial pulsing.

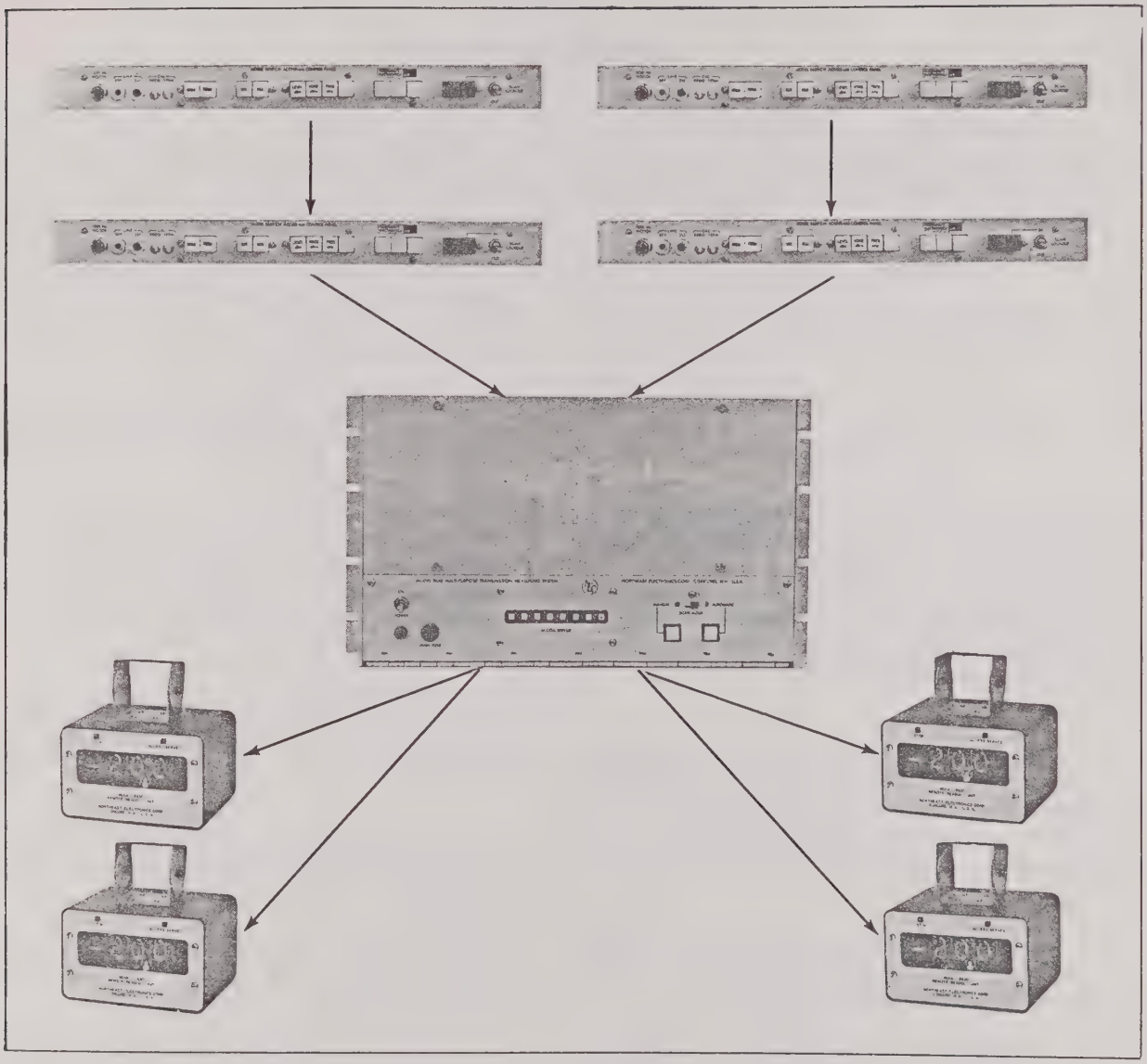


Figure 1—1. Typical 8600 System Component Units

1.15 SYSTEM DESCRIPTION

1.16 The Model 8600 is shipped as a fully prewired, factory-tested system ready for installation. Typically, the complete system can be installed in one day or less.

1.17 All units ordered for an office are cabled together and are thoroughly pretested as an operating system before shipment. Cables are supplied in correct, customer-specified lengths with connectors factory-installed. No on-site cable making or connector wiring is required.

1.18 Furthermore, the system can be easily expanded at any time in the future. Whenever more access or readout units are needed, they simply plug into the existing system with a single cable connection.

1.19 CENTRAL MEASUREMENT UNIT

1.20 The central measurement unit has 8 time-shared input ports and an equal number of corresponding data readout ports as shown in Figure 1—2. Any number of access units can be connected in tandem, chain-fashion to each of the input ports. Thus, the measurement unit actually time-shares its services between 8 full chains of access units. Measurement requests from all 8 chains can be serviced simultaneously, but within each chain only one access unit may be used at a time.

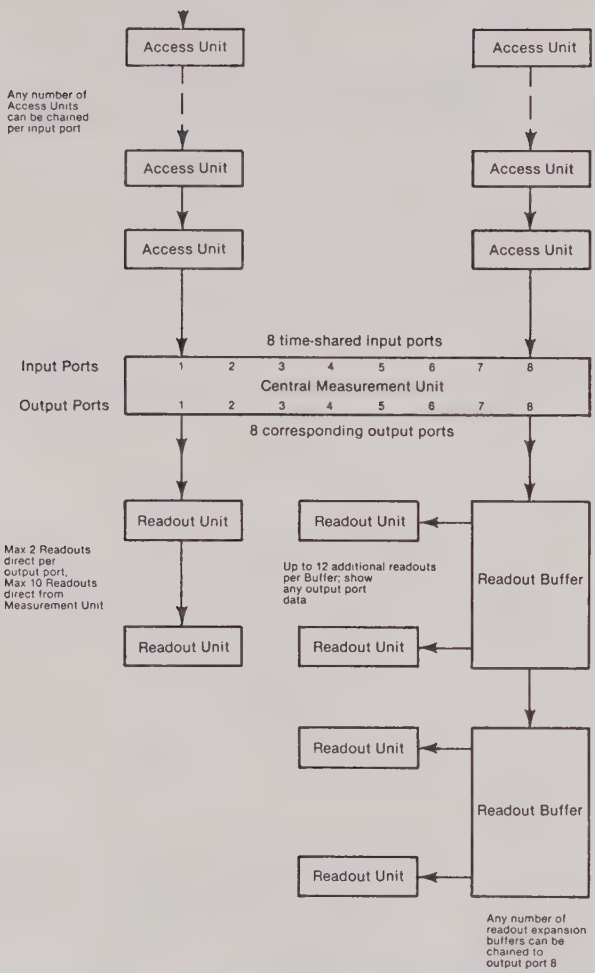

Access Unit
Access Unit
Any number of Access Units can be chained per input port
Access Unit
Access Unit
Access Unit
Access Unit
8 time-shared input ports
Input Ports
1 2 3 4 5 6 7 8
Central Measurement Unit
Output Ports
1 2 3 4 5 6 7 8
8 corresponding output ports
Readout Unit
Readout Unit
Max 2 Readouts direct per output port, Max 10 Readouts direct from Measurement Unit
Up to 12 additional readouts per Buffer; show any output port data
Readout Buffer
Readout Unit
Readout Unit
Readout Unit
Readout Buffer
Readout Unit
Any number of readout expansion buffers can be chained to output port 8

Figure 1—2. Typical 8600 System Arrangement

1.21 Results of measurements requested at any input port appear on the readout unit(s) connected to the corresponding output port. By itself, the measurement unit can drive a total of 10 readouts . . . one each per output port, plus two additional which can be connected in parallel at any two output ports.

NOTE

A dual readout unit . . . which displays both level and frequency simultaneously . . . can be substituted for two of the single readout units. Use of a dual readout requires internal dual readout driver PC Card (PN 0086-12-011) installed in the central measurement unit.

1.22 But, the system's readout capacity is not limited to these built-in provisions. For applications requiring greater numbers of readouts, small buffer units are used to expand capabilities in increments of 12 readouts each. The buffers are physically chained to output port 8, but their attached readouts can display measurement results from any of the output ports as needed in an application.

1.23 The readouts at any output port are automatically blanked when their corresponding input port is available for measurements. Readouts are also blanked if their input port receives a signal outside the measurement unit's maximum dynamic operating range.

1.24 Results of any measurement may be displayed simultaneously on all readouts connected to the system if needed to show data in many different places at the same time.

1.25 The measurement unit can be installed in any convenient location, but must be within 250 cable-feet of the most distant access unit and within 1000 cable-feet of the most distant single readout unit.

1.26 A rear panel connector on the measurement unit makes all test results available in BCD-coded format for output to a printer and/or other peripherals as desired. Data lines at this connector also identify the type of measurement and the requesting input port. (Optional)

1.27 ACCESS UNITS

1.28 Numerous access unit models are available for different installations. Most models contain only the jacks needed to patch-in circuits for testing and the pushbuttons needed to select appropriate input impedance conditions. A user may select either 600-ohm or 900-ohm terminating impedance . . . or high impedance bridging. These access units require only 1¾ inches (4.5 cm) of vertical panel space in standard-width racks.

1.29 A compact model is available for mounting in 17B, 17C, 18B and similar testboards.

1.30 A model with no panel jacks or pushbuttons is available for wiring into testboards in such a way that the jacks and switches already on these boards can be used directly to request measurements by the 8600 system.

1.31 Percent break testing by the 8600 system is implemented using special access units and a plug-in card for the measurement unit. Two access unit models are available for this use. One model is a receive-only unit capable of measuring incoming percent break. A second model can measure both percent break and speed . . . it can also generate percent break test pulsing at selectable loop resistance and line leak conditions.

1.32 All access unit models are available with an optional 2-dB pad for installations involving type 17C and similar equipment.

1.33 Pushbuttons on all access units are illuminated when pressed. For this reason, a 48-Vdc power connection is required at each access unit location.

1.34 READOUT UNITS

1.35 Readouts are available for rack-mounting, or with a top swivel bracket for suspended-mounting from ceilings, overhead supports, or equipment frames.

1.36 Basic readout models display measurement results as 4 numeric digits with ± sign and automatically-positioned decimal point. Dual readout models allow a system user to view data simultaneously from two measurements . . . level and frequency.

1.37 The readouts require no external power source. They receive operating power from the measurement unit, or the buffer unit, to which they are cabled.

1.38 MODES OF OPERATION

1.39 SCAN MODE

1.40 The input ports are sequentially scanned from 1 to 8 in search of a measurement request from an access unit. If a request for measurement is present, the central measurement unit:

- ☐ Stops at the appropriate port;
- ☐ Makes the requested measurement;
- ☐ Presents the measurement result data to the digital readout unit associated with the input port making the request;
- ☐ Resumes scanning.

All open input ports, and those input ports not requesting a measurement, are passed over with no loss of scanning time.

1.41 If two or more users in the same access chain make simultaneous measurement requests, priority is given to the user nearest the central measurement unit in that particular chain. The second user cannot receive service until the first user has either removed the test connection from his access unit jack or disengaged his measurement function pushbutton. The second access unit in the chain will then be serviced the next time the central measurement unit scans that input port. The remaining access input ports and associated access chains are scanned in sequence, and measurements are taken when requested. Thus a great number of users can be serviced on a time-shared basis that is in most cases, rapid enough to appear to be nearly real time.

1.42 The SCAN MODE switch on the front panel of the central measurement unit is normally set to the AUTOMATIC position and locked there. This provides the scan mode just described. For the purpose of troubleshooting the entire system, it is often desirable to manually control the scan function. In this case, the SCAN MODE switch is set to the MANUAL position, and the scanner can be advanced by momentarily depressing the associated pushbutton while observing the eight ACCESS SERVED indicators.

1.43 STOP AND SCAN LOCKOUT MODES

1.44 Any user can place the system in the stop mode of operation. This is done by depressing and holding the STOP pushbutton on an access unit until the green ACCESS SERVED indicator on the corresponding readout unit is lighted. At this time all readout units in the system will display the results of a measurement taken at the input port that requested the stop. And the red STOP indicators on all readout units will be lighted.

1.45 This mode allows a user to make a measurement or make an adjustment and view the most conveniently located readout unit. The central measurement unit is returned to the scan mode when any user momentarily depresses his SCAN button.

1.46 When making an adjustment, it is sometimes desirable to dedicate the system to the single user making the adjustment. When using the 8650, 8651, 8654, 8655, and 8647 access units, this is done by first entering the stop mode as previously described and then placing the scan lockout switch (located on the access unit) to the IN position. All readouts in the system (if not blanked) are then dedicated to the single user making the stop request, and remain so until the lockout switch is returned to the OUT position.

1.47 EQUIPMENT COMPONENTS

1.48 For application versatility, a wide variety of component units can be used together to form a complete Model 8600 system. The available component units, options, cables, and ancillary items are listed and described in Table 1—1. Size, weight, and input power information for the component units is shown on Figure 1—3.

Table 1—1. Model 8600 System Components, Cables, And Options

CENTRAL MEASUREMENT EQUIPMENT	
8610A-CN Central Measurement Unit (card bay)	Comes equipped to measure level, C-message noise, and frequency. Includes 1010-Hz notch filter. Equipped to service up to 10 Readout Unit loads. Has universal 19-inch rack mount adapters. See outline drawing A, Figure 1—3.
Option 3	Plug-in circuit card adds percent break and pulsing speed measurement capabilities to the 8610A.
Option 4	Plug-in circuit card adds 3-kHz flat noise measurement capability to the 8610A.
Option 7	Plug-in circuit card adds 15-kHz flat noise measurement capability to the 8610A.
Option 10	Two-dB attenuation pad for Access Unit; one Option 10 used in each Access Unit so equipped.
0086-12-011 Card	Dual readout driver circuit card plug-in. Expands the 8610A to handle Dual Readout Units (8640 or 8641) on more than two output ports. Each 0086-12-011 allows use of the Dual Readout Units on two additional output ports of the 8610A.
READOUT UNITS	
8630 Single Readout Unit	For top or side mounting by swivel bracket (8636). Readout is an end-connect type for use alone at any 8610A output port or for use to end a chain containing parallel-connect type readouts on any 8610A output port. See outline drawing B, Figure 1—3. (A rack-mount version is available as 8632.)
8631 Single Readout Unit	For top or side mounting by swivel bracket (8636). Readout is a parallel-connect type for use as an intermediate readout in a chain on any 8610A output port. A chain may have one or two 8631 units. Or, a chain may have one 8631 unit and be ended by one 8630 or 8632 unit. See outline drawing B, Figure 1—3.
8632 Single Readout Unit	Rack-mount version of the 8630 readout. Standard unit fits 19-inch rack.* See outline drawing C, Figure 1—3.
8636 Swivel Bracket	For mounting the 8630, 8631, and 8640 Readout Units.
8640 Dual Readout Unit	Gives simultaneous display of both level and frequency measurement results. For top or side mounting by swivel bracket (8636). Readout is an end-connect type for use alone at any 8610A output port. See outline drawing D, Figure 1—3. (A rack-mount version is available as 8641.)
*Adapters for 23-inch rack mounting are available; other sizes on special order.	

Table 1—1. (cont'd)

READOUT UNITS (cont'd)	
8641 Dual Readout Unit	Rack-mount version of the 8640 readout. Standard unit fits 19-inch racks.*
8647 Dual Readout Plus Access Unit	Combination of 8641 readout and 8650 access units on a single panel 26 inches wide by 2-3/8 inches high.
Readout Cables	Readout Units are connected to other system equipment by use of 8638 and/or 8639 Cable Assemblies. Specific information is presented under heading of "Interconnection Cables".
ACCESS UNITS	
8650 Access Unit	End-connect type for use alone on any 8610A input port or for use at the end of a parallel-connect type Access Unit chain on any 8610A input port. Standard unit fits 19-inch racks.* See outline drawing F, Figure 1—3.
8651 Access Unit	Parallel-connect type for use as an intermediate Access Unit in a chain on any 8610A input port. A chain can have as many 8651s as required and may be terminated with one 8650, 8653, 8654, or 8655 end-connect type Access Unit. Standard unit fits 19-inch racks.* See outline drawing F, Figure 1—3.
8653 Remote Controlled Access Unit	End-connect type, same as 8650, but with no jacks or controls on the front panel. Rear-panel connections permit easy wiring to jacks and controls on existing testboards. Standard unit fits 19-inch racks.* See outline drawing G, Figure 1—3.
8654 Testboard Access Unit	End-connect type, same as 8650, but mounts in space only 7-3/4 inches wide by 4 inches high for compact installation in 17B, 17C, 18B, and similar testboards. See outline drawing H, Figure 1—3.
8655 Bantam Jack Access Unit	End-connect type, same as 8650, but with Bantam-size jacks instead of 309-type jacks. Standard unit fits 19-inch racks.* See outline drawing F, Figure 1—3.
*Adapters for 23-inch rack mounting are available; other sizes on special order.	

Table 1—1. (cont'd)

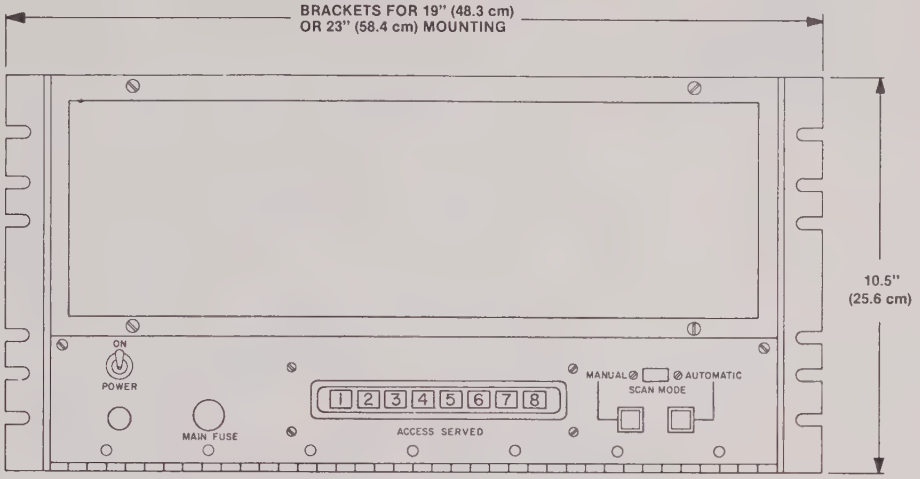
ACCESS UNITS (cont'd)	
8673 Receive-Only Percent Break Measurement Adapter	Special type of Access Unit which permits measurement of percent break of dial pulsing received on a loop or E & M basis. Has no jacks or controls on front panel. Rear-panel connections allow easy wiring to jacks and controls in existing testboards. The 8673 is a parallel-connect type, for use as an intermediate device in an Access Unit chain on any 8610A input port. The 8610A must have Option 3. Standard 8673 units fit 19-inch racks.* See outline drawing I, Figure 1—3.
8674 Send/Receive Signaling Test Adapter	A special type of Access Unit for: ☐ Sending pulse signaling on a loop or E & M basis with adjustable percent break, pulsing speed, and other parameters; ☐ Measuring speed and percent break of pulse signaling received on a loop or E & M basis. The 8674 is a parallel-connect type, for use as an intermediate device in an Access Unit chain on any 8610A input port. The 8610A must have Option 3. Standard 8674 units fit 19-inch racks.* See outline drawing J, Figure 1—3.
Two-dB Pad Option	As required, individual Access Units can be equipped with a 2-dB attenuation pad (Option 10).
Access Cables	Access Units are connected to other system equipment by use of 8657 Cable Assemblies. Specific information is presented under heading of "Interconnection Cables".
READOUT QUANTITY EXPANSION EQUIPMENT	
8622 Multi-Readout Buffer	Allows 12 additional Readout Units to be driven by the 8610A Central Measurement Unit. Any of the additional readouts can display data from any of the 8610A's output ports, in any combination. Multiple 8622 buffers can be connected in tandem to provide any total readout capacity required. Standard 8622 buffer units fit 19-inch racks.* See outline drawing K, Figure 1—3.
*Adapters for 23-inch rack mounting are available; other sizes on special order.	

Table 1—1. (cont'd)

READOUT QUALITY EXPANSION EQUIPMENT (cont'd)	
0086-22-018 Cable	Read line cable assembly which must be used in each intermediate 8622 Multi-Readout Buffer tandemed onto the 8610A Central Measurement Unit. The end buffer in the tandem chain does **not** require 0086-22-018.
INTERCONNECTION CABLES	
8637 Cable Assembly	Use to connect 8622 Multi-Readout Buffer on output port 8 of the 8610A Central Measurement Unit. Can be any required length up to 10 feet maximum.
8638 Cable Assembly	Use as follows: ☐ To connect Readout Units on output ports 1 through 7 of the 8610A Central Measurement Unit; ☐ To connect Readout Units on any output port of the 8622 Multi-Readout Buffer; ☐ For interconnections between Readout Units in a tandem chain on an 8610A output port. Maximum lengths are: ☐ 1000 feet from 8610A or 8622 to the farthest Single Readout Unit in a chain; ☐ 500 feet from 8610A or 8622 to the farthest Dual Readout Unit in a chain.
8639 Cable Assembly	Use to connect Readout Unit on output port 8 of the 8610A Central Measurement Unit. Can be any required length up to 1000 feet for Single Readout Units . . . up to 500 feet for Dual Readout Units.
8657 Cable Assembly	Use to connect Access Units with any input port of the 8610A Central Measurement Unit. Also use for interconnections between chained Access Units. Maximum allowable cable distance between 8610A and farthest Access Unit is 250 feet.
*Adapters for 23-inch rack mounting are available; other sizes on special order.	

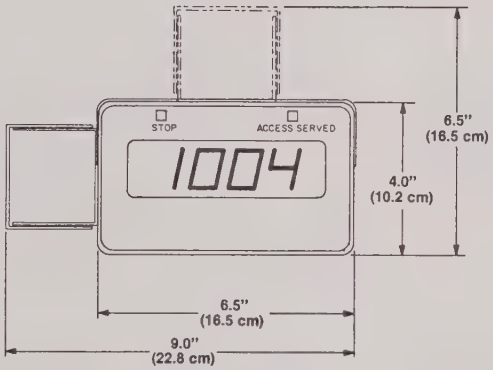
OUTLINE A
Model 8610A -CN
Central Measurement Unit

- DEPTH: 11.6" (29.5 cm)
- WEIGHT: 29 lb (13.2 kg)
- POWER: 48 Vdc at 4A



OUTLINE B
Model 8630 and 8631
Single Readout Units

- DEPTH: 8" (20.3cm)
- WEIGHT: 2.5 lb (1.1 kg)
- POWER: NONE REQUIRED



OUTLINE C
Model 8632
Single Readout Unit

- DEPTH: 5.3" (13.5 cm)
- WEIGHT: 2.25 lb (1 kg)
- POWER: NONE REQUIRED

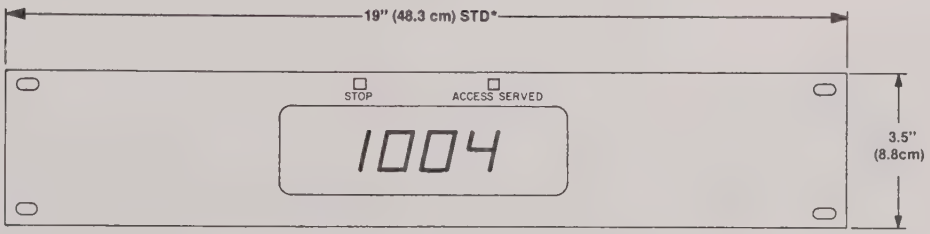
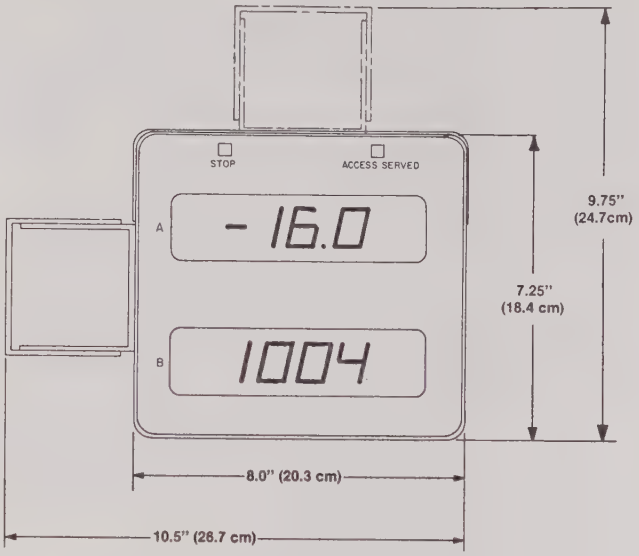


Figure 1—3. Component Unit Outline Drawings

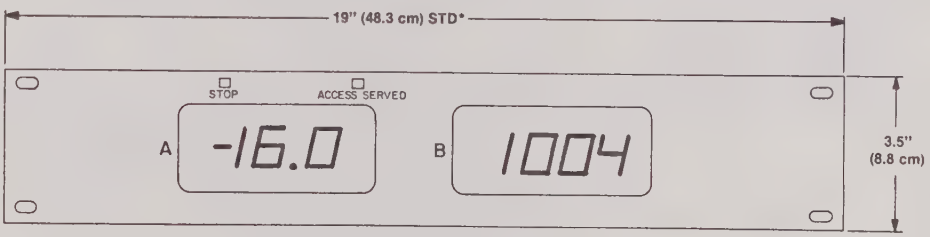
OUTLINE D
Model 8640
Dual Readout Unit

- DEPTH: 9.7" (24.6 cm)
- WEIGHT: 5 lb (2.3 kg)
- POWER: NONE REQUIRED



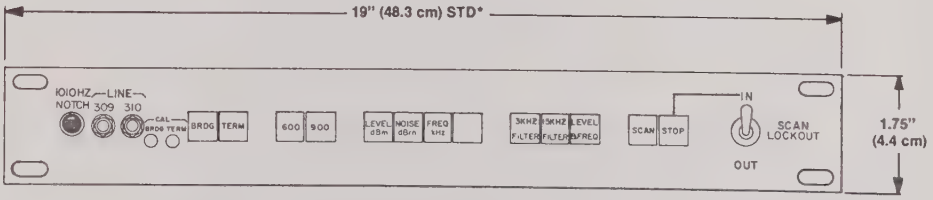
OUTLINE E
Model 8641
Dual Readout Unit

- DEPTH: 5.5 "(14 cm)
- WEIGHT: 3.75 lb (1.7 kg)
- POWER: NONE REQUIRED



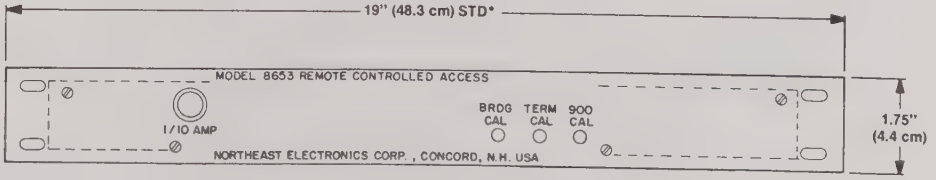
OUTLINE F
Model 8650, 8651
And 8655 Access Units

- DEPTH: 7" (17.8 cm)
- WEIGHT: 5.25 lb (2.4 kg)
- POWER: 48 Vdc at 250 mA



OUTLINE G
Model 8653
Remote Controlled
Access Unit

- DEPTH: 5" (12.7 cm)
- WEIGHT: 3.25 lb (1.5 kg)
- POWER: 48 Vdc at 50 mA



OUTLINE H
Model 8654
Testboard
Access Unit

- DEPTH: 5.75" (14.6 cm)
- WEIGHT: 4 lb (1.8 kg)
- POWER: 48 Vdc at 250 mA

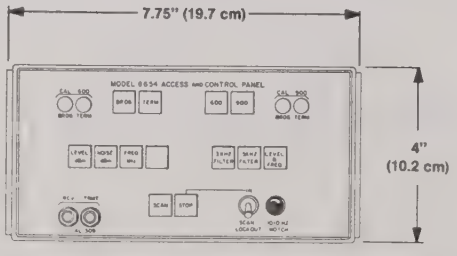
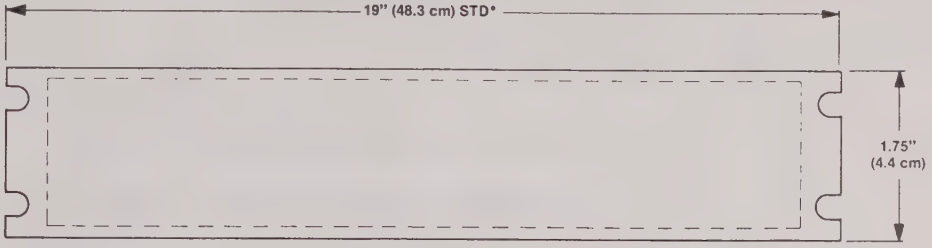


Figure 1—3. (cont'd)

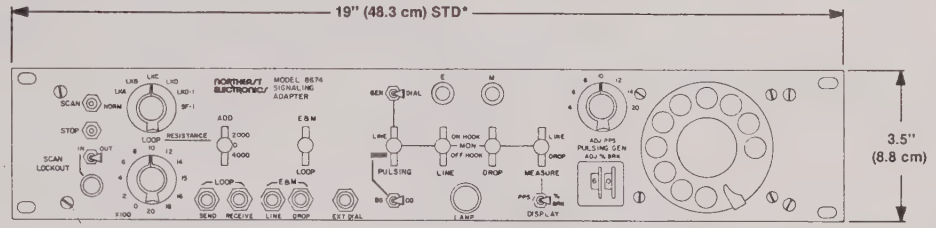
OUTLINE I
Model 8673
Receive-Only
Percent Break
Adapter

- DEPTH: 6.2" (15.8 cm)
- WEIGHT: 3.75 lb (1.7 kg)
- POWER: 48 Vdc at 300 mA



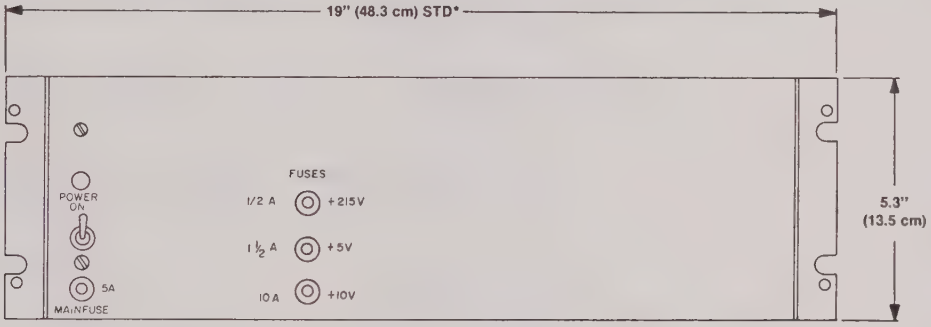
OUTLINE J
Model 8674
Send/Receive
Signaling Test
Adapter

- DEPTH: 6.5" (16.5 cm)
- WEIGHT: 9 lb (4.1 kg)
- POWER: 48 Vdc at 1A



OUTLINE K
Model 8622
Multi-Readout
Buffer

- DEPTH: 12" (30.5 cm)
- WEIGHT: 13 lb (5.9 kg)
- POWER: 48 Vdc at 3A



* Adapters for 23" (58.4 cm) rack mounting are available; other sizes on special order.

Figure 1—3. (cont'd)

1.49 RELATED DOCUMENTS

1.50 The documents listed in Table 1—2 are helpful in planning, installing, and using the Model 8600 Multi-Purpose Transmission Measuring System.

Table 1—2. Model 8600 System Documents

TITLE	PART NO.
☐ 8600 System Basic Operation And Maintenance Manual (Note 1)	A0086-12-600
☐ 8600 System Installation Manual	A0086-12-601
☐ 8600 System Applications And Ordering Manual	A0086-12-602
☐ 8622 Multi-Display Buffer Instruction Manual (Note 2)	A0086-22-600
☐ 8647 Access And ıal Display Instruction Manual	A0086-47-600
☐ 8653 Remotely Controlled Access Panel Instruction Manual	A0086-53-600
☐ 8654 Testboard Access Panel Instruction Manual	A0086-54-600
☐ 8673 Percent Break Adapter Instruction Manual (Note 3)	A0086-73-600
☐ 8674 Signaling Test Adapter Instruction Manual	A0086-74-600

NOTE 1: Covers 8610A-CN Central Measurement Unit Plus 8630, 8631, 8633, 8637, 8638, 8639, 8640, 8641, 8650, 8651 8657 units and dual readout card A0086-12-011.

NOTE 2: Includes read line interconnection cable W1, A0086-22-018.

NOTE 3: Includes Option 3 plug-in card for 8610A-CN measurement unit.

SECTION 2

SPECIFICATIONS

2.1 Overall specifications for the Model 8600 System are listed in Table 2—1.

Table 2—1. Model 8600 System Specifications

LEVEL MEASUREMENTS	
Accuracy/Range:	±0.1 dB from −40 to +10 dBm; ±0.25 dB from −55 to +14 dBm (≈2 dB hysteresis built in at extremes)
Resolution:	0.1 dB
Accuracy vs Frequency:	±0.1 dB from 150 Hz to 10 kHz; ±0.2 dB from 100 Hz to 12 kHz; 0.2 dB typical at 15 kHz; 0.75 dB typical at 20 kHz.
Accuracy vs Temperature:	±0.003 dB/°C from 0°C to 50°C
Accuracy vs Supply Voltage:	±0.01 dB from 43.2 to 52.8 Vdc
Detection Technique:	Averaging
NOISE MEASUREMENTS	
Accuracy/Range:	±0.25 dB from 10 to 70 dBrn; ±1 dB from 5 to 74 dBrn
Resolution:	1 dB
Frequency Response Weighting:	C-message and 1010-Hz notch filters are standard (see Figures 2—1 and 2—2); 3-kHz flat with Option 4 (see Figure 2—3); 15-kHz flat with Option 7 (see Figure 2—4).
Detection Technique:	Quasi rms
FREQUENCY MEASUREMENT	
Range:	50 Hz to 100 kHz
Resolution:	Autoranging; 1 Hz up to 9.999 kHz; 10 Hz from 10 to 99.99 kHz; 100 Hz above 100 kHz.
SIGNALING MEASUREMENTS (Option 3 plus 8673 or 8674)	
Receive Measurements Via 8673 or 8674:	Loop or E & M pulsing; measures percent break from 20 to 80% with resolution of 0.1%; measures pulsing speed (8674 only) from 4 to 24 pps with resolution of 0.5%.

Table 2—1. (cont'd)

Send Pulsing From 8674:	Sends loop or E & M pulsing; adjustable percent break from 0 to 100% with accuracy of ± 1%; selectable speeds of 4, 6, 8, 10, 12, 14, and 20 pps with accuracy of ±0.5 pps; selectable loop resistance and line leak values for margin testing on signaling loops.
TRANSMISSION TEST INPUT IMPEDANCES	
Terminating:	Balanced 600 or 900 ohms ± 5%; less than ± 5° phase angle from 100 Hz to 20 kHz; less than ± 10° phase angle from 100 Hz to 50 kHz
Bridging:	Approximately 15 kohms at 1 kHz; bridging error calibrated out at access jack.
TRANSMISSION TEST INPUT BALANCE:	>100 dB at 60 Hz; > 60 dB at 6 kHz; decreasing at 6 dB/octave above 6 kHz
MAX DC VOLTAGE AT INPUT JACKS:	56 Vdc
POWER REQUIREMENTS:	See information on outline drawings of Figure 1—3
SIZES AND WEIGHTS:	See information on outline drawings of Figure 1—3.

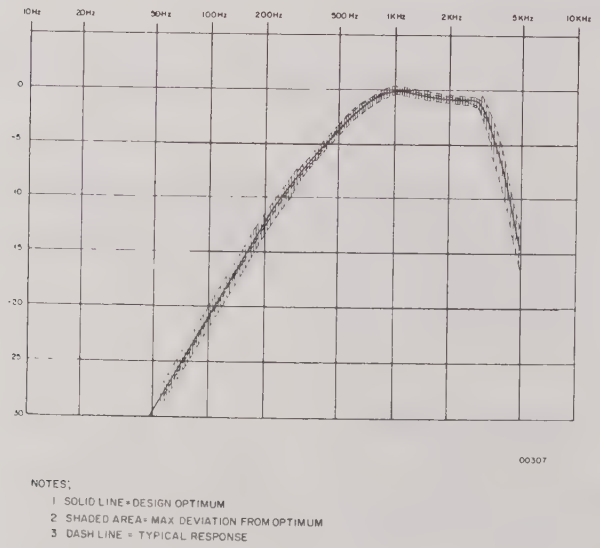


Figure 2—1. C-Message Noise Filter Response Curve

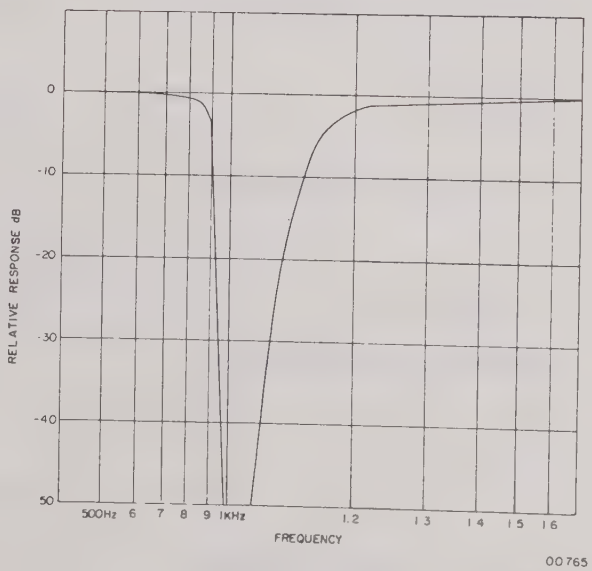
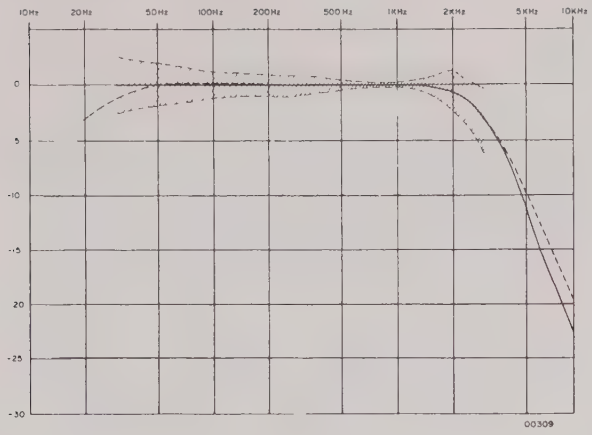
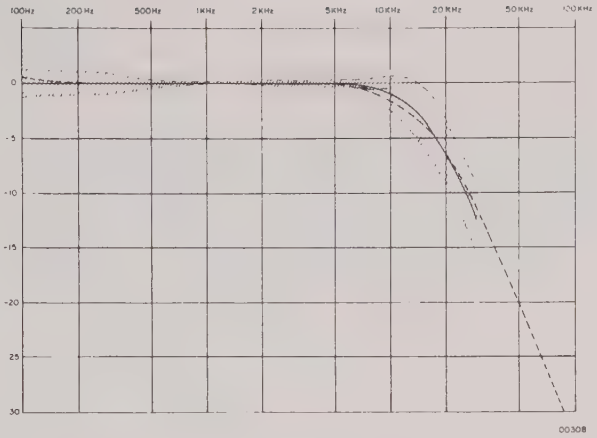


Figure 2—2. 1010-Hz C-Notch Filter Response Curve



NOTES;
1. SOLID LINE = DESIGN OPTIMUM
2. SHADED AREA = MAX. DEVIATION FROM DESIGN OPTIMUM
3. DASH LINE = TYPICAL RESPONSE

Figure 2—3. 3-kHz Flat Noise Filter Response Curve



NOTES;
1. SOLID LINE = DESIGN OPTIMUM
2. SHADED AREA = MAX. DEVIATION FROM OPTIMUM
3. DASH LINE = TYPICAL RESPONSE

Figure 2—4. 15-kHz Flat Noise Filter Response Curve

SECTION 3

INSTALLATION

3.1 All Model 8600 System components ordered for an office are cabled together and pretested at the factory as an operating system prior to shipment. Cables are supplied in correct, customer-specified lengths with connectors factory-installed. No on-site cable making or connector wiring is required.

3.2 The outline drawings on Figure 1—3 are a handy reference to the installation dimensions, weights, and power requirements of various system components.

3.3 Fully detailed information needed to install and interconnect the various system components, cables, etc., is provided in a separate manual, "Model 8600 Installation Instructions" (part number A0086-12-601). Refer to this installation manual for Circuit Application Drawings (CAD's) and other installation information.

SECTION 4

OPERATION

4.1 CONTROLS AND INDICATORS

4.2 Table 4—1 lists the function of each operating control and indicator shown on Figure 4—1. Paragraphs 4.3 through 4.13 provide the operating instructions.

Table 4—1. Controls And Indicators

INDEX NO.	DESCRIPTION	FUNCTION
1	LINE 310 & 309 jacks	These jacks provide access to the input circuitry of the 8600 system.
2	1010 Hz NOTCH pushbutton	When pressed, this pushbutton inserts a 1010-Hz C-notch filter into the measurement path. Effective only in NOISE measurements.
3	BRDG/TERM 600/900 pushbuttons	These pushbuttons select input impedance. Approximately 15 kohms in BRDG; 600 or 900 ohms in TERM.
4	LEVEL/NOISE/FREQ pushbuttons	These pushbuttons select the measurement function of the 8600 system.
5	Optional pushbuttons	These pushbuttons select optional measurement functions.
6	SCAN/STOP pushbuttons and SCAN LOCKOUT toggle switch	These switches select automatic access unit sequencing or dedicated service to one access unit.
7	POWER toggle switch	This switch applies power to the 8600 system power supplies. The lamp indicates that power has been applied.
8	MAIN FUSE	The fuse provides current overload protection for the 8600 system.
9	ACCESS SERVED lamps	These lamps indicate which of the eight access unit chains is being served.
10	SCAN MODE pushbutton and slide switches	These switches select automatic or manual sequencing of access unit service.
11	Readout Tubes	The readout tubes provide visual results of measurements made by the 8600 system.
12	ACCESS SERVED lamp	This lamp indicates that service is being provided at this location.
13	STOP lamp	This lamp indicates that the system has been pre-empted by one access unit location.

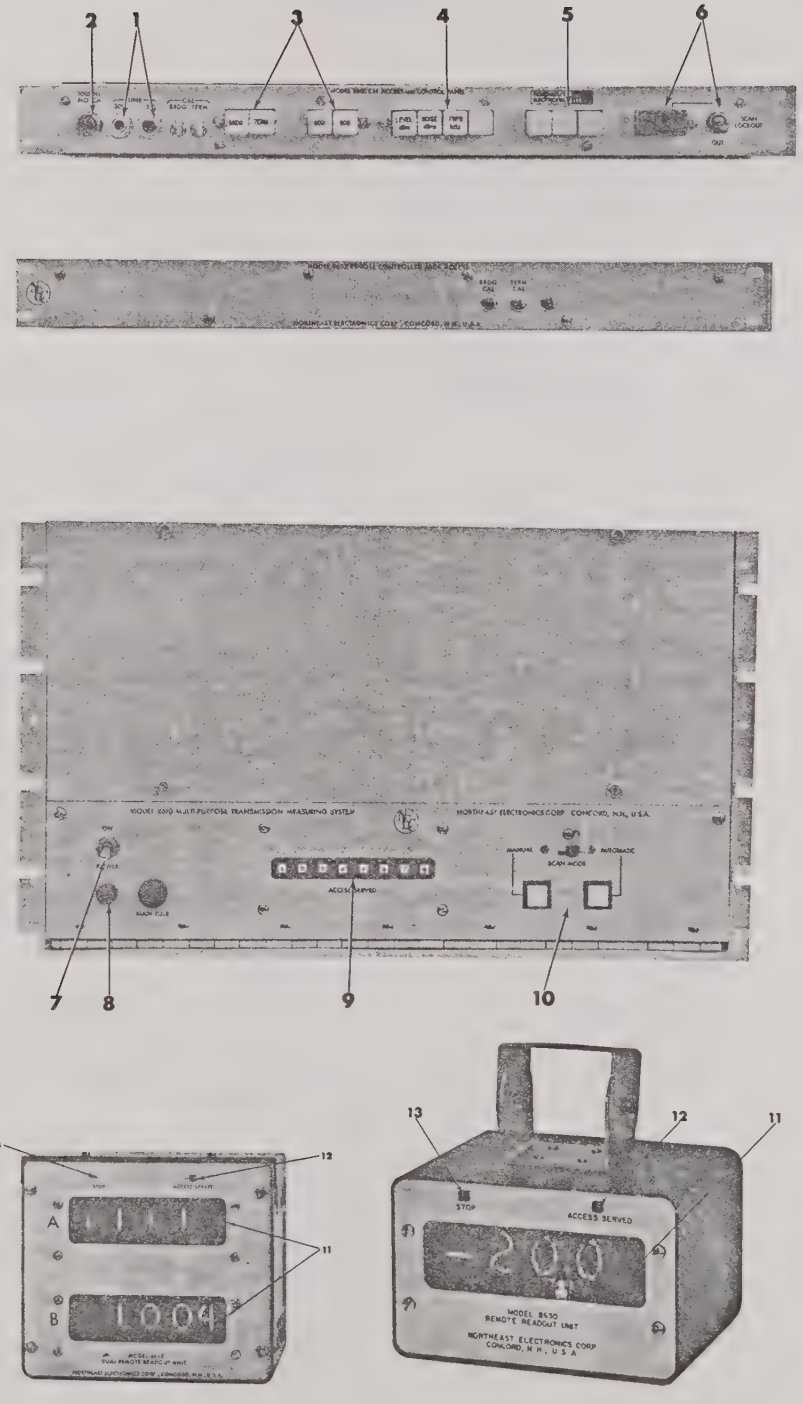


Figure 4—1. Model 8600 System Units, Controls And Indicators

4.3 OPERATING INSTRUCTIONS

4.4 LEVEL MEASUREMENTS

4.5 To make level measurements, perform the following steps.

1. On access unit, press 600 or 900 (ohm) button as appropriate for impedance of circuit to be tested.

2. On access unit, press either BRDG or TERM pushbutton to select either high-impedance bridging or terminating.

3. On access unit, press LEVEL dBm pushbutton.

4. Patch circuit to be tested into either the 309 or the 310 LINE jack on the access unit.

5. If system scanning is presently stopped (shown by lighted red STOP lamp on readout unit), momentarily press SCAN button on access unit. (Be sure access unit's SCAN LOCKOUT switch is at OUT position.)

6. Observe level measurement results (in dBm) on the associated readout unit.

7. If a variable adjustment is being made on equipment under test, it may be desirable to press and hold the STOP button on the access unit until the ACCESS SERVED indicator lights on the associated readout unit. (Red STOP lamps will be lighted on all other readout units connected to the system.) This action dedicates the 8600 system to the access unit requesting the STOP, and provides extra fast measurement updating while an adjustment is being made. All system readout units will display results of measurement service provided to the stop-requesting access unit. The requesting craftsman can view any readout unit to observe his test data. The system is returned to SCAN mode by pressing the SCAN button on any access unit (unless SCAN LOCKOUT switch on STOP-requesting access unit is at IN position).

NOTE

During variable adjustments on equipment under test, it is sometimes desirable to place the access unit SCAN LOCKOUT switch at IN position. This will prevent any other access units from returning the system to SCAN mode until released by the access unit which has imposed the SCAN LOCKOUT.

4.6 NOISE MEASUREMENTS

4.7 To make noise measurements, perform the following steps.

1. On access unit, press 600 or 900 (ohm) button as appropriate for impedance of circuit to be tested.

2. On access unit, press the TERM button.

3. On access unit, press NOISE dBrn button. This enables noise measurement with C-message weighting. (If system is equipped with optional 3-kHz flat and/or 15-kHz flat noise weighting filters, these may be selected by pressing NOISE button **plus** either the 3 KHZ FILTER or 15KHZ FILTER button.)

3. On access unit, press 1010 HZ NOTCH switch if a C-notched noise measurement is desired. The 1010HZ NOTCH can be used with any noise weighting filter in the system (C-message, 3-kHz flat, and/or 15-kHz flat).

NOTE

Pressing the LEVEL button automatically inhibits the 3-kHz, 15-kHz, and 1010 Hz notch filters, should these buttons be engaged. Pressing the FREQ kHz button with either the 3 kHz or 15 kHz filter buttons engaged adds 30 dB of gain and limits frequency response to either the 3 kHz or 15 kHz range.

4. Patch circuit to be tested into either the 309 or 310 LINE jack on the access unit.

NOTE

For accurate noise measurements, the circuit under test must be terminated with proper impedance at the distant end.

5. If system scanning is presently stopped (shown by lighted red STOP lamp on readout unit), momentarily press SCAN button on access unit. (Be sure access unit's SCAN LOCKOUT switch is at OUT position.)

6. Observe noise measurement results (in dBrn) on the associated readout unit.

4.8 FREQUENCY MEASUREMENTS

4.9 To measure frequency, perform the following steps.

1. On access unit, press 600 or 900 (ohm) button as appropriate. (For frequency measurements on circuits or equipment of other impedances, press either the 600 or 900 button . . . doesn't matter. Then press BRDG button in step 2 below. This presents a high impedance to the circuit or equipment under test.)

2. On access unit, press either BRDG or TERM button to select either high-impedance bridging or terminating.

3. On access unit, press FREQ kHz button.

NOTES

(a) For stable frequency measurement, the maximum peak impulse noise permissible on a signal to be counted is as follows:

☐ 55 dBrn maximum wideband noise for signals in the level range from −20 to +10 dBm

☐ 25 dBrn maximum wideband noise for signals in the level range from −50 to −20 dBm.

(b) If the system is equipped with optional 3-kHz and/or 15-kHz noise filters, either filter may be used during frequency measurements. Pressing the FREQ kHz button **plus** either the 3KHZ FILTER or 15KHZ FILTER button will add 30 dB of gain to increase counting sensitivity and will also restrict input frequency spectrum to 3 kHz or 15 kHz respectively.

4. Patch signal to be measured (counted) into either the 309 or 310 LINE jack on access unit.

5. If system scanning is presently stopped (shown by lighted red STOP lamp on readout unit), momentarily press SCAN button on access unit. (Be sure access unit's SCAN LOCKOUT switch is at OUT position.)

6. Observe frequency measurement results (in kHz) on the associated readout unit.

NOTE

Frequency measurements have the decimal point automatically positioned to read in kHz. For example: 1004 Hz will appear as 1.004 kHz.

4.10 SIMULTANEOUS LEVEL AND FREQUENCY MEASUREMENTS

4.11 For simultaneous level and frequency measurements on systems equipped with dual readout units (8640 or 8641), perform the following steps.

1. On access unit, press 600 or 900 (ohm) button as appropriate for impedance of circuit to be tested.

2. On access unit, press either BRDG or TERM button to select either high-impedance bridging or terminating.

3. On access unit, press LEVEL + FREQ button. (The folowing buttons must all be released: LEVEL dBm, NOISE dBrn, FREQ kHz, 1010 HZ NOTCH.)

4. Patch circuit to be tested into either 309 or 310 LINE jack on the access unit.

5. If system scanning is presently stopped (shown by lighted red STOP lamp on readout unit), momentarily press SCAN button on access unit. (Be sure access unit's SCAN LOCKOUT switch is at OUT position.)

6. Observe level measurement results (in dBm) on readout display A (top on 8640, left on 8641).

7. Observe frequency measurement results (in kHz) on readout display B (bottom on 8640, right on 8641).

NOTES

(a) Do not attempt to measure LEVEL + FREQ in the STOP mode. Also, do not attempt to measure NOISE or FREQ with the LEVEL + FREQ button pressed.

(b) If frequency display on a readout unit exhibits random numbers when in an idle situation, press the LEVEL button on the associated access unit. Then release the level button. This will blank out both displays (level and frequency) on the readout unit.

4.12 OPERATION WITH PARALLEL LINE JACK IN 17B OR 17C BOARD APPLICATIONS

4.13 The 8600 System access units are sometimes used in applications where an access unit LINE jack is wired in parallel to an external jack which is located for convenience of a system user. In this case, it may be necessary to amend the operating procedures as follows.

1. Follow procedures as outlined for level, noise, and frequency measurements, but patch circuit under test into the externally located jack.

2. Insert a dummy plug into either the 309 or 310 LINE jack on the access unit.

NOTES

(a) In some applications which are arranged with jack control leads, the last step (number 2) above can be omitted.

(b) A 2-dB pad may be present between the access unit and the external jack. Check installation records to determine if the pad is present. If present, circuits patched to the external jack will be measured through the pad. But, circuits patched directly to the access unit's 309 or 310 LINE jacks will be measured without the pad loss.

SECTION 5

THEORY OF OPERATION

5.1 Figure 5—1 is a simplified block diagram showing functional relationships: (a) between the system's component equipment units, and (b) between the individual circuit cards of the 8610A-CN central measurement unit.

5.2 The following paragraphs provide simplified functional diagrams and circuit descriptions for the individual component units and circuit cards. Detailed schematic diagrams appear in Section 7 of this manual.

5.3 MODEL 8610A-CN CENTRAL MEASUREMENT UNIT CIRCUIT DESCRIPTIONS

5.4 The following paragraphs describe the functions of internal circuit cards and assemblies within the 8610A central measurement unit. Refer to the functional diagrams in this section and to the schematic diagrams of Section 7 as aids in understanding the written circuit descriptions.

5.5 DUAL LINE ASSY'S, TYPE 1 (CARDS 1, 2, 3)

5.6 The dual line cards provide proper interfacing between the central measurement unit and the access units attached to it. In effect, the dual line cards are the input ports of the 8610A central measurement unit.

5.7 Each of the dual line cards can handle the TIP/RING transmission pairs and the MEASURE REQUEST control signals from two access unit chains. As shown on the simplified diagram of Figure 5—2, any MEASURE REQUEST received from an access unit is applied to a request line gating block which produces a REQUEST LINE OUTPUT to the scanner board.

5.8 In response to a REQUEST LINE OUTPUT, the scanner board returns a READ LINE signal input to the corresponding measure command gating and access switching blocks on the dual line card. The measure command gating block then gates the active MEASURE REQUEST input to the card's MEASURE COMMAND output lines, thus establishing the type of measurement to be made.

5.9 Simultaneously, the card's access switching block routes the TIP/RING pair under test to the card output for presentation to the 8610A unit's actual measurement functions.

5.10 When the requested measurement is completed, a TRANSFER DATA command appears at the card input, and is applied to the request line gating blocks. This causes the active request line gating block to initiate a TRANSFER DATA TO DISPLAY pulse which causes associated readout unit(s) to display the measurement data.

5.11 As shown on the overall system block diagram (Figure 5—1), the TIP/RING and MEASURE COMMAND outputs of all dual line cards in the 8610A are bused together. The REQUEST LINE and TRANSFER DATA TO DISPLAY outputs are employed by the scanner card and the readout units to select the individual input port being measured and displayed in scan mode. In stop mode, all DATA TRANSFER TO DISPLAY lines are activated so all readouts show the same data.

5.12 DUAL LINE ASSY, TYPE 2 (CARD 4)

5.13 The dual line assembly (card 4) is similar to cards 1, 2, and 3 in all respects except that card 4 can enable simultaneous level and frequency measurements when using dual readout unit(s). This capability is provided only in scan mode, and is accomplished by generating alternate level and frequency measure requests on every other scan cycle. The two measurements are made at different times, but are displayed simultaneously.

5.14 The dual line assembly, type 2, is normally used as card 4 (serves access/readout ports 7 and 8). However, it can be interchanged with the dual line assemblies, type 1, normally used in card slots 1, 2, or 3. This permits simultaneous level and frequency measurements to be provided for other access/readout ports when desired.

NOTE

It must be remembered that the 8610A can only drive a maximum of 10 readout unit loads, and that dual readouts count as two loads each.

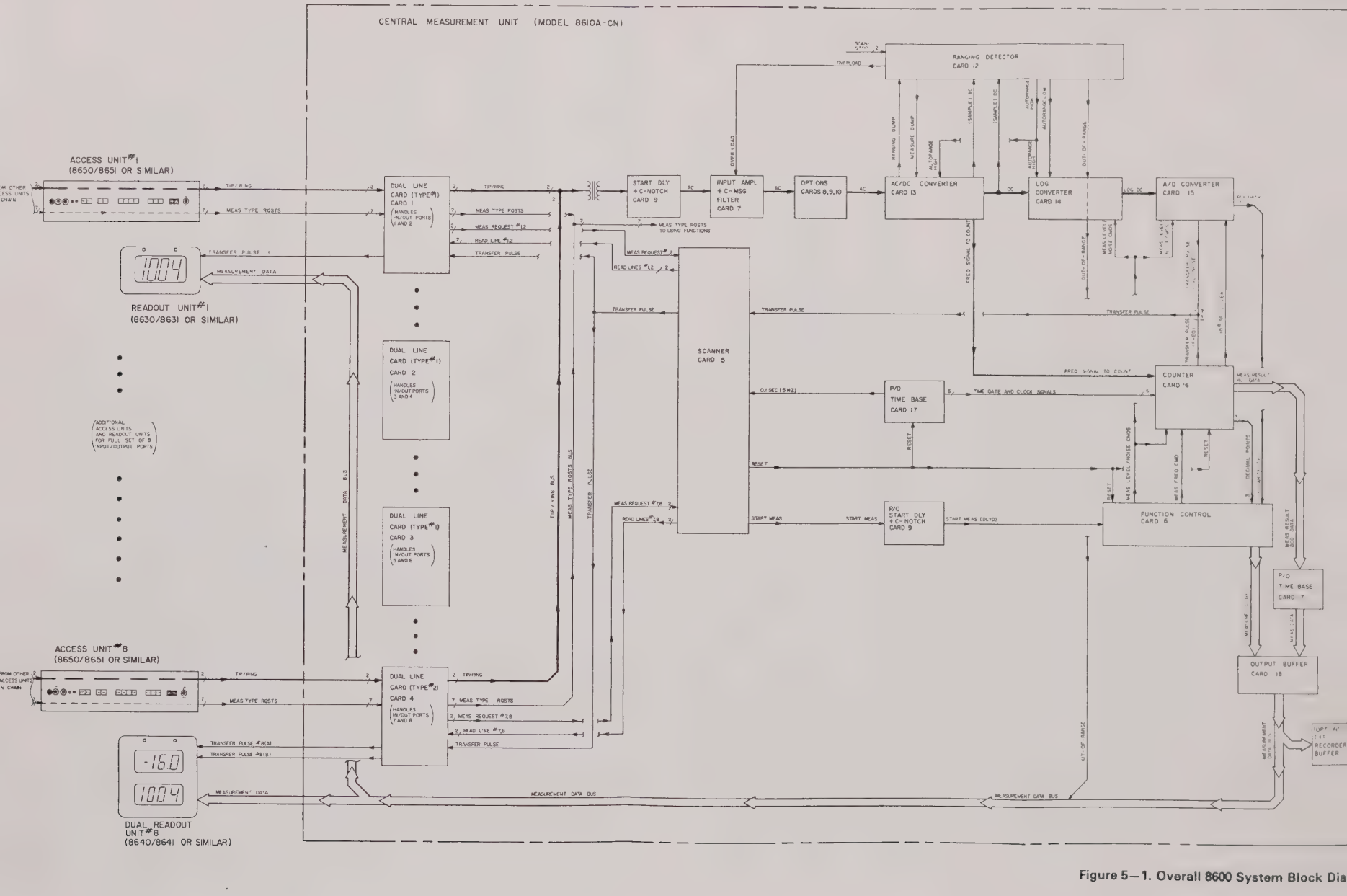

CENTRAL MEASUREMENT UNIT (MODEL 8610A-CN)
ACCESS UNIT #1 (8650/8651 OR SIMILAR)
READOUT UNIT #1 (8630/8631 OR SIMILAR)
ADDITIONAL ACCESS UNITS AND READOUT UNITS FOR FULL SET OF 8 INPUT/OUTPUT PORTS
ACCESS UNIT #8 (8650/8651 OR SIMILAR)
DUAL READOUT UNIT #8 (8640/8641 OR SIMILAR)
DUAL LINE CARD (TYPE #1) CARD 1 (HANDLES IN/OUT PORTS 1 AND 2)
DUAL LINE CARD (TYPE #1) CARD 2 (HANDLES IN/OUT PORTS 3 AND 4)
DUAL LINE CARD (TYPE #1) CARD 3 (HANDLES IN/OUT PORTS 5 AND 6)
DUAL LINE CARD (TYPE #2) CARD 4 (HANDLES IN/OUT PORTS 7 AND 8)
START DLY + C-NOTCH CARD 9
INPUT AMPL + C-MSG FILTER CARD 7
OPTIONS CARDS 8,9,10
AC/DC CONVERTER CARD 13
RANGING DETECTOR CARD 12
LOG CONVERTER CARD 14
A/D CONVERTER CARD 15
SCANNER CARD 5
COUNTER CARD 16
P/O TIME BASE CARD 17
P/O START DLY + C-NOTCH CARD 9
FUNCTION CONTROL CARD 6
P/O TIME BASE CARD 7
OUTPUT BUFFER CARD 18
TIP/RING
MEAS TYPE RQSTS
MEAS REQUEST #1,2
READ LINES #1,2
TRANSFER PULSE
MEASUREMENT DATA
MEAS TYPE RQSTS TO USING FUNCTIONS
MEAS REQUEST #7,8
READ LINES #7,8
TRANSFER PULSE #8(A)
TRANSFER PULSE #8(B)
0.1 SEC (5 MHZ)
TIME GATE AND CLOCK SIGNALS
RESET
START MEAS
START MEAS (DLYD)
FREQ SIGNAL TO COUNT
OUT-OF-RANGE
OVERLOAD
MEASUREMENT DATA BUS
TIP/RING BUS
MEAS TYPE RQSTS BUS
TRANSFER PULSE

Figure 5—1. Overall 8600 System Block Dia

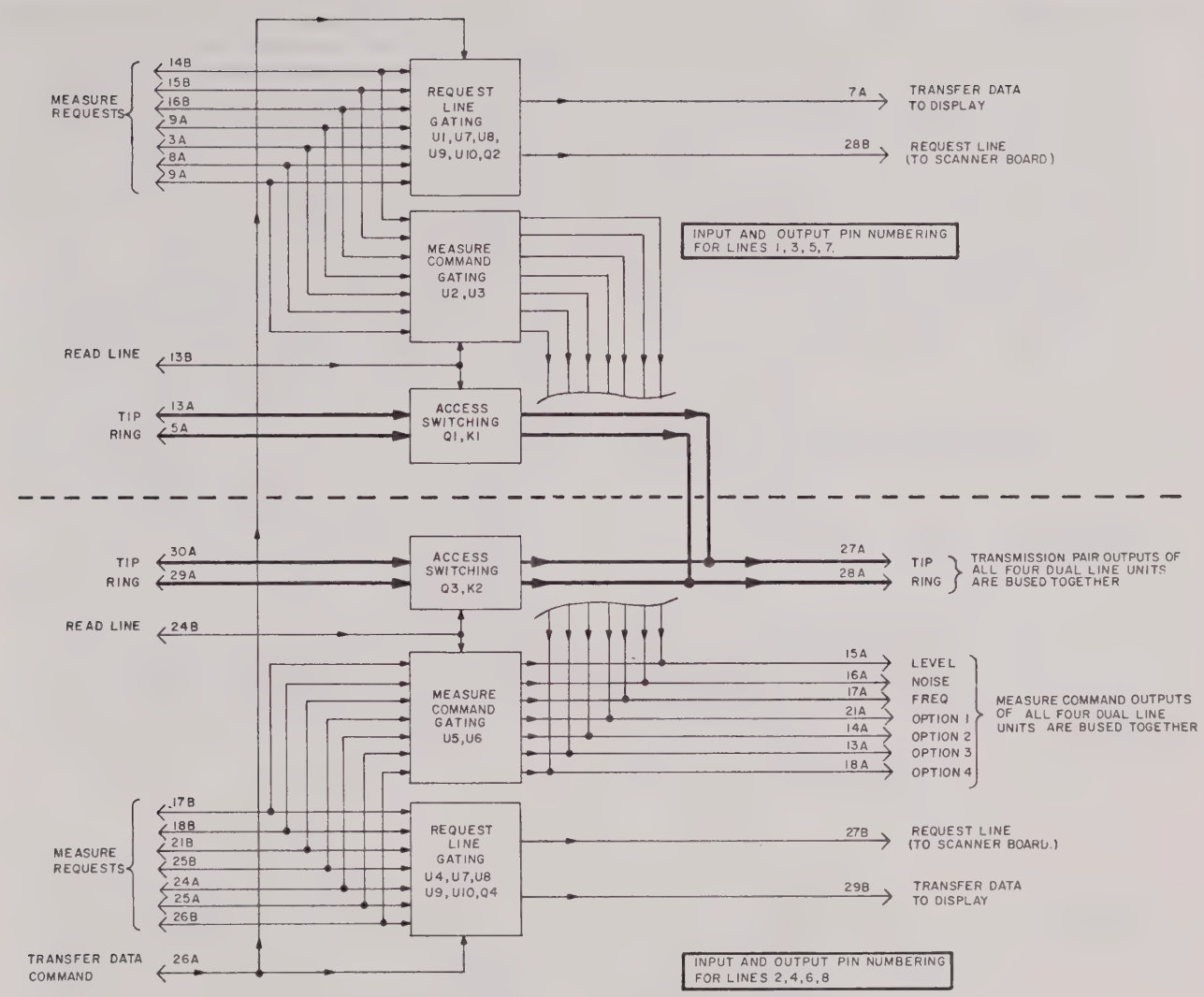


Figure 5—2. Dual Line Assembly (Cards 1, 2, 3, 4) Block Diagram

5.15 SCANNER (CARD 5)

5.16 The scanner card provides automatic sequencing and stop mode measure recycling for the 8610A. Refer to Figure 5—3 for aid in understanding the circuit description.

5.17 The scanner sequentially examines the eight REQUEST LINES from the dual line assemblies to determine if a measurement request is present. This sequential examination is performed by request line multiplexer block U3 in accord with the states of a 1, 2, 4 BCD-coded count produced by counter U6A, U7.

5.18 The BCD count status also drives read line decoder block U4 (a 4-line to 10-line decoder). Thus, the U4 block produces READ LINE outputs (to the dual line assemblies) in exact synchronism with the REQUEST LINE status scanning being performed by U3. Therefore, for each BCD count, one REQUEST LINE is examined and one corresponding READ LINE is activated.

5.19 BCD counter U6A, U7 is advanced by pulses from clock Q1, Q2. The clock also triggers strobe one-shot U12 which strobes request line multiplexer U3 to enable actual examination of the selected REQUEST LINE.

5.20 The sequencing proceeds until a request for measurement service appears on one of the REQUEST LINES. When the active REQUEST LINE is examined, an output from multiplexer U3 to start/stop flip-flop U6B inhibits further operation of clock Q1, Q2. This: (a) stops the sequencing, (b) produces a READ LINE output corresponding to the active REQUEST LINE, and (c) initiates a START MEASURE CYCLE output.

5.21 When the requested measurement is completed, a TRANSFER PULSE appears as input to transfer and reset one-shots U5, U10. The one-shots then produce a TRANSFER DATA signal which causes the active dual line card to command measurement result display on an associated readout unit. At the same time as the TRANSFER DATA command, the U5, U10 one-shots also generate a reset pulse that releases clock Q1, Q2 to resume sequencing through the REQUEST LINES, looking for another measurement request.

5.22 The scanner can be manually stopped at any REQUEST LINE (and corresponding READ LINE), by pressing the STOP button on any access unit. This applies MANUAL CLOCK INHIBIT to flip-flop U11A in coincidence with a request for service on the corresponding REQUEST LINE.

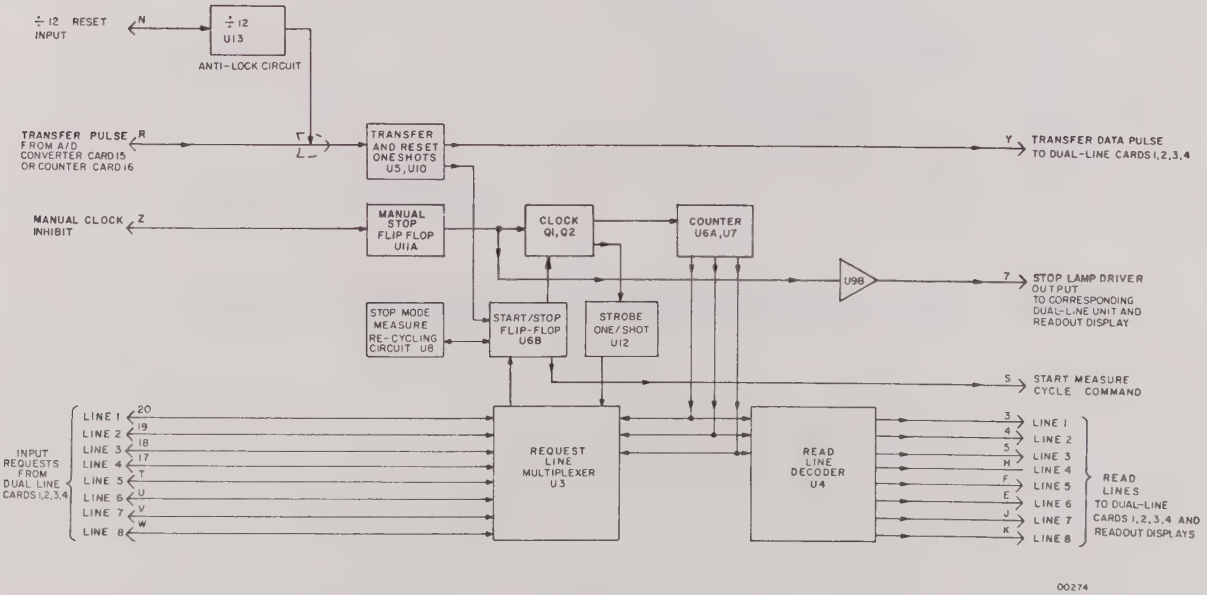


Figure 5—3. Scanner (Card 5) Block Diagram

5.23 The output of flip-flop U11A inhibits clock Q1, Q2. This stops the scanning. It also conditions stop measure recycle block U8 and start/stop flip-flop U6B to produce a continuous sequence of START MEASURE CYCLE commands. This provides automatic updating of a measurement in the stop mode, and continues until the system is returned to the scan mode.

5.24 In the absence of a TRANSFER PULSE from the 8610A's measurement functions, the ÷ 12 counter U13 initiates its own transfer pulse to prevent lock-up.

5.25 FUNCTION CONTROL (CARD 6)

5.26 The function control card produces a 4-bit measurement code which is supplied to attached readout unit(s) via output buffer card 18. The code indicates type-of-measurement, polarity (±), and decimal point location. The function control card also produces various signals needed to properly control the 8610A's measurement circuits. Refer to the block diagram of Figure 5—4.

5.27 When a measurement request is present, an inverted MEASURE COMMAND from the active dual line card is applied to function control card 6. Requests for level or noise measurements are gated (via U1, U5A) to (a) decoding logic U4, U6, (b) command gating flip-flops U3B, U8, and (c) to outputs which control the 8610A's A/D converter and logarithmic converter cards.

5.28 Besides the gated level/noise measure command information, decoding logic U4, U6 receives polarity (±) information from A/D converter card 15 and decimal point information from counter card 16. Based on the combination of this input information, decoding logic U4, U6 provides diode matrix CR1-CR12 with codes that correspond to placement of the decimal points, measurement polarity (±), and measurement type. The diode matrix supplies measure code gating U5, U2 with 4-line BCD-coded information that will be gated to the readout unit(s) via output buffer card 18.

5.29 The measure code gating U5, U2 circuits are inhibited when a DATA BLOCK COMMAND is applied to card 6.

5.30 Level, noise, and frequency measurement control commands for the A/D converter and counter cards are created by command flip-flops U3B, U8. Requests for the measurements are clocked into command flip-flops U3B, U8 by delay one-shot U7, which is triggered by START MEASURE CYCLE. The delay period of U7 permits the measurement functions within the 8610A to stabilize before actually making a measurement. The delay period is much shorter when the system is in stop mode, as controlled by STOP COMMAND via Q1.

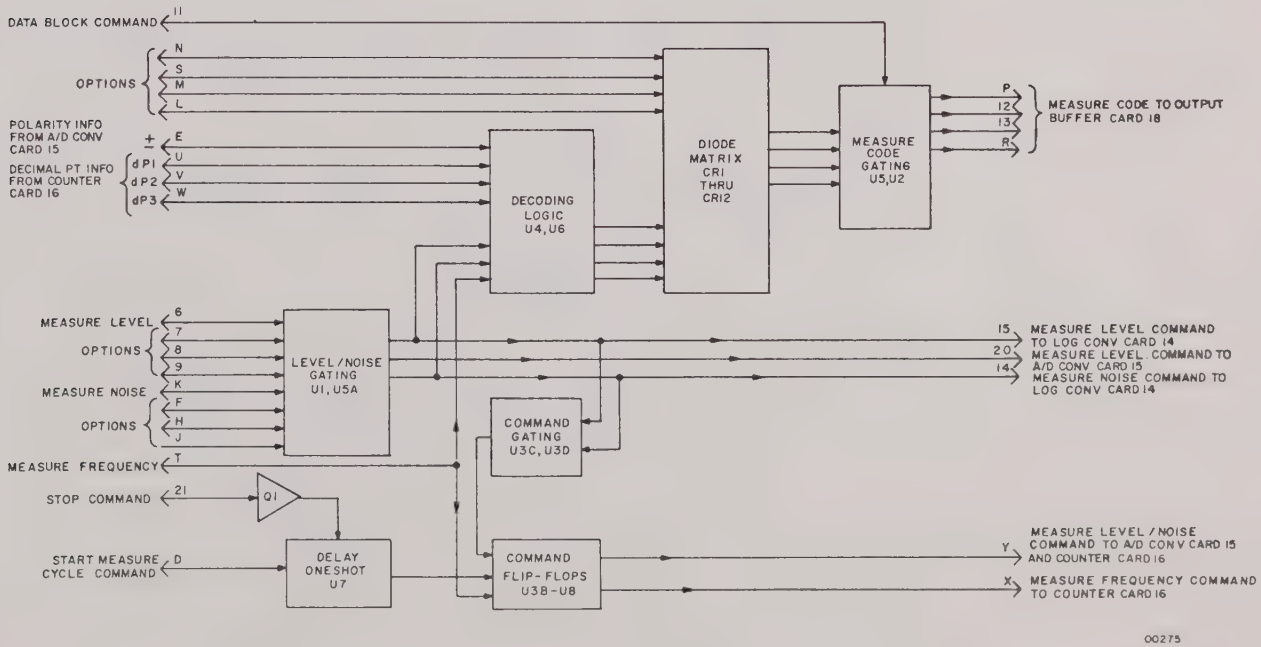


Figure 5—4. Function Control (Card 6) Block Diagram

5.31 PERCENT BREAK CONVERTER, OPTION 3 (USE AS CARD 8)

5.32 The percent break converter card (option 3) replaces the thru-connection card in slot 8 of the 8610A when the system is equipped to measure pulse signaling percent break and speed. In addition to the option 3 card in slot 8, the system must also be equipped with suitable signaling test access units, either:

☐ 8673 . . . receive only, percent break only;

☐ 8674 . . . send and receive, percent break and pulsing speed.

5.33 The same Option 3 percent break converter card in slot 8 handles measurements from either type of signaling test access unit. Refer to the simplified block diagram of Figure 5—5 which shows how percent break converter card 8 interfaces between the 8673 signaling access unit and the 8610A central measurement unit.

5.34 Inserting a plug into a signaling test access jack initiates a request for measurement of percent break via the 8673 unit. When the 8610A receives the request, it applies a MEAS % BRK REQUEST signal and a DELAYED START MEASURE command to percent break converter card 8.

5.35 The MEAS % BRK REQUEST operates relay K1 and connects incoming signaling pulses (TIP/RING) from the 8673 to signal conditioning block U24A, U24B U25, U27. The signaling pulses are gated through count-up gate U20A, U24C, U24D and pulse stretcher U1 by gate control flip-flop U19A.

5.36 In the count-up interval, percent break time storage register U15, U16, U17 accumulates 5-kHz pulses during break periods of the input pulsing. At the same interval, period gate U20B enables period time storage register U12, U13, and U14 to accumulate 5-kHz pulses continuously.

5.37 In approximately 0.45 second measure period control one-shot U18B times out. This terminates the count-up interval and intiates a count-down interval by enabling count-down period and data gate control flip-flop U22A.

5.38 Percent break time storage register U15, U16, and U17 is enabled to count down to zero. Period gate U20B is disabled, so the count accumulated in period time storage register U12, U13, and U14 remains stored during count down.

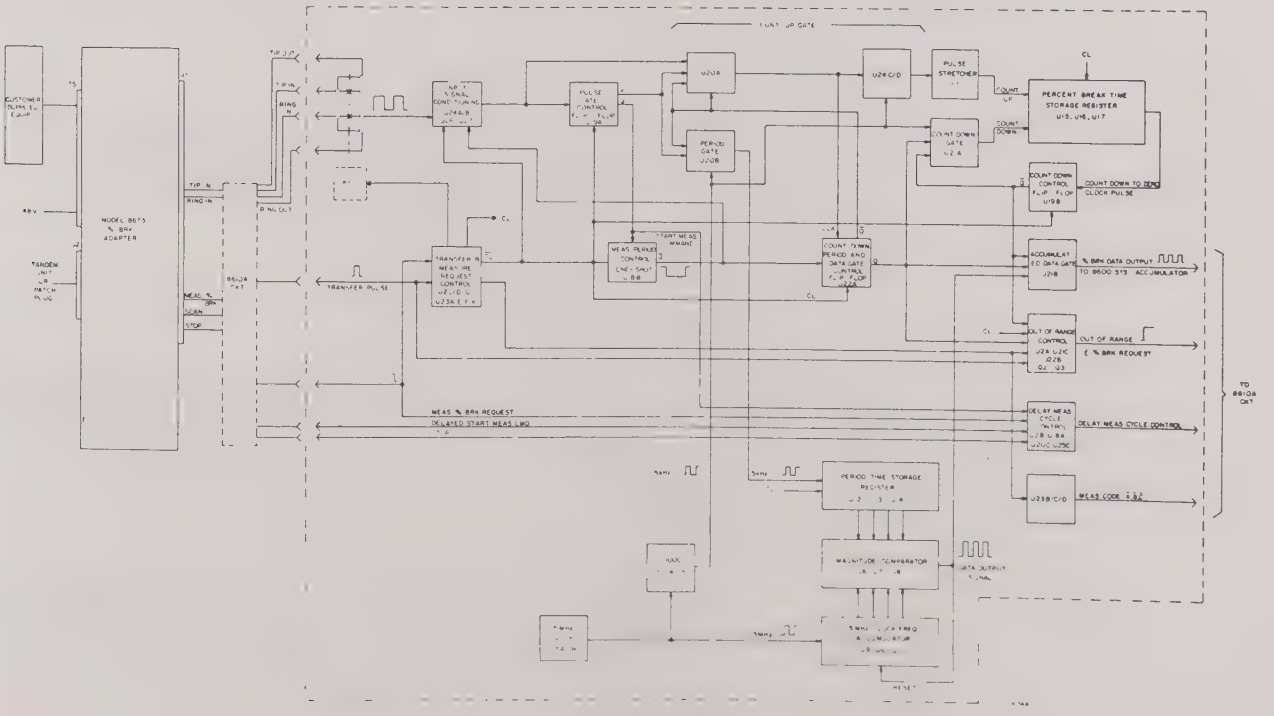

PERCENT BREAK TIME STORAGE REGISTER U15, U16, U17
PERIOD TIME STORAGE REGISTER
MAGNITUDE COMPARATOR
MEAS % BRK REQUEST
DELAYED START MEAS CMD
TRANSFER PULSE
OUT OF RANGE
DELAY MEAS CYCLE CONTROL
COUNT DOWN TO ZERO CLOCK PULSE
% BRK DATA OUTPUT TO 8600 S/S ACCUMULATOR
TO 8610A OUT

Figure 5—5. Option 3 Percent Break Converter (Card 8) Block Diagram

5.39 A series of counts equal to the number stored in U12, U13, U14 is counted by 5-MHz clock frequency accumulator U9, U10, U11. Each time the two counts are equal, magnitude comparator U6, U7, U8 develops a data output pulse.

5.40 Since the data output pulse resets clock-accumulator U9, U10, U11, the result is a series of data output pulses being gated through accumulated data gate U21B. These pulses are presented to the 8610A's count accumulator circuits on counter card 6.

5.41 Inverters U23B, U23C, U23D on percent break converter card 8 originate the measure code which is used by the 8610A to properly format and transfer the percent break measurement result to associated digital readout unit(s).

5.42 Shortly after completion of the count-down interval, a TRANSFER PULSE is received from the 8610A to initiate transfer of accumulated data. In addition, measure request control block U2C, U2D, U23A, U23E, U23F, Q1 is caused to clear the percent break converter circuits.

5.43 If, for any reason, the percent break data overflows, out-of-range control block U2A, U21C, U22B, U3, Q2 produces an OUT OF RANGE command which instructs the 8610A to blank associated readout unit(s).

5.44 More detailed information on operation of the Option 3 percent break converter card and signaling access units is presented in the access unit manuals:

☐ 8673 . . . manual A0086-73-600

☐ 8674 . . . manual A0086-74-600.

5.45 START MEAS DELAY AND NOTCH FILTER (CARD 9)

5.46 This card has two functions.

1. It delays the START MEASURE CYCLE command for about 30 milliseconds, allowing time for the 8610A's measurement functions to settle before an actual measurement is made.

2. It allows a 1010-Hz C-notch filter to be selectively inserted in the measurement transmission path enabling the 8600 system to perform noise-with-tone measurements.

5.47 Refer to the block diagram of Figure 5—6. In scan mode when a START MEASURE CYCLE (0) signal appears at the input to card 9, one-shot U6 is triggered to produce a 30-millisecond DELAYED START MEAS CYCLE pulse output. The falling edge of this pulse triggers one-shot U7 on function control card 7, starting the measure cycle after a time delay.

5.48 The 30-millisecond delay produced by U6 on card 9 allows settling time for the 8610A's measurement circuits. Since this time is not required in stop mode, U5 provides gating to by-pass one-shot U6 when the STOP signal is active.

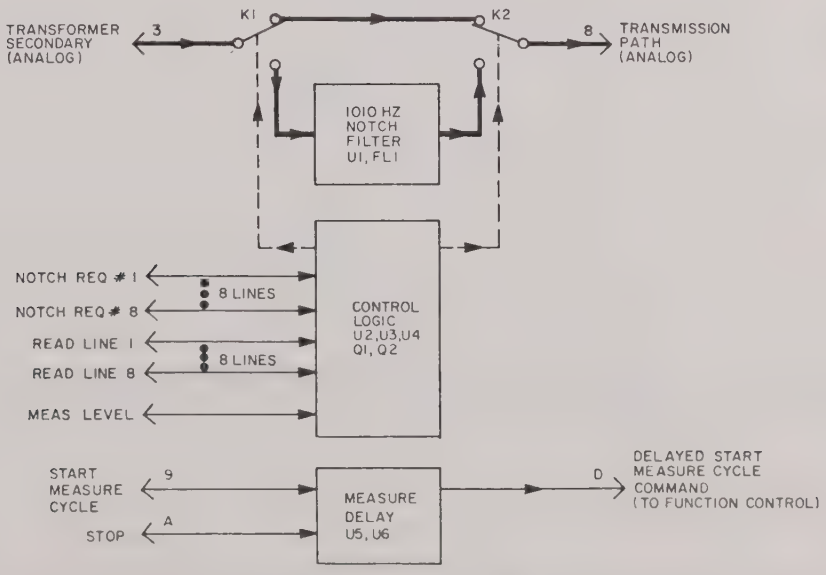


Figure 5—6. Start Meas Delay And Notch Filter (Card 9) Block Diagram

5.49 When a NOTCH REQUEST appears with a corresponding active READ LINE for either a noise or frequency measurement, then the control logic block U2, U3, U4, Q1, Q2 operates relays K1 and K2. This switches 1010-Hz notch filter U1, FL1 into the signal path. The notch filter has a frequency rejection response as shown in Figure 2—2.

5.50 Amplifier U1 provides 6 dB of gain to compensate for the insertion loss of filter FL1. When a level measurement request occurs, MEAS LEVEL becomes active to disallow selection of the notch filter, even if a NOTCH REQUEST should appear.

5.51 INPUT AMPLIFIER AND C-MESSAGE FILTER (CARD 7)

5.52 This card provides impedance conversion, gain selection, overload protection, and either: (a) flat frequency response, or (b) C-message weighted frequency response.

5.53 Refer to the block diagram of Figure 5—7. Note that the diagram shows card 7 functions as selected during a noise measurement.

5.54 When a MEASURE NOISE input appears, gain and output control block U1A, Q1, Q2 energizes relay K2 which switches C-message filter U3 into the measurement transmission path. The frequency response of C-message filter U3 is shown in Figure 2—1.

5.55 Relay K1 is also energized during a noise measurement, causing input amplifier U2 to supply the higher gain required for noise measurements.

5.56 During measurements other than noise, relays K1 and K2 are released. This lowers the gain of input amplifier U2 and bypasses C-message filter U3.

5.57 The U4 stage is a 3-pole active lowpass filter which provides response rolloff above 20 kHz to suppress spurious high frequency noise.

5.58 Input overload clamp Q13, Q14, CR14, CR15 protects against excessive input signal strength. It shorts the input signal line to ground via CR14, CR15 and Q4 when an OVERLOAD CLAMP command is received from ranging signal detector card 12.

5.59 A MEASURE LEVEL RESPONSE command is gated to ac-dc converter card 13 by the measure level response gating block (U1B) on card 7. The gating occurs whenever card 7 receives an active MEASURE LEVEL (0) input.

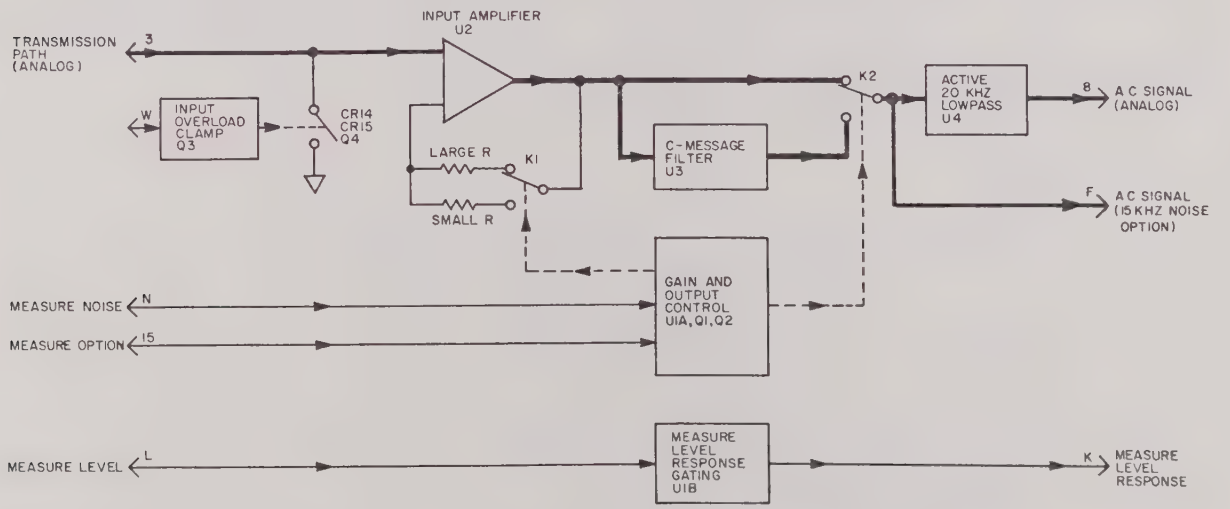


Figure 5—7. Input Amplifier And C-Message Filter (Card 7) Block Diagram

5.60 3-KHZ FILTER, OPTION 4 (USE AS CARD 10)

5.61 The 3-kHz filter card (Option 4) replaces the thru-connection card in slot 10 of the 8610A. This equips the system to measure noise with 3-kHz flat frequency response weighting. Refer to the block diagram in Figure 5−8.

5.62 The Option 4 circuit is a two-pole active lowpass filter with the −3 dB point at 3 kHz. The ultimate attenuation slope is 12 dB/octave. The filter's response curve is shown in Figure 2−3.

5.63 The circuit has 30 dB of gain, with calibration adjustable via R3. Relays K1 and K2 are energized when OPTION 2 MEASURE NOISE is active, provided MEAS LEVEL is inactive. Selector and bypass control U1, Q1 handles operation of the relays.

5.64 15-KHZ FILTER, OPTION 7 (USE AS CARD 10 OR 11)

5.65 The 15-kHz filter card (Option 7) can replace the thru-connection card in either slot 10 or 11 of the 8610A. It is used in slot 10 if the 3-kHz filter (Option 4) is **not** present. If the 3-kHz filter option is present in slot 10, then the 15-kHz filter card goes in slot 11.

5.66 The Option 7 card equips the system to measure noise with 15-kHz flat frequency response weighting. Refer to the block diagram in Figure 5−9.

5.67 The Option 7 circuit is a two-pole active lowpass filter with the −3 dB point at 15 kHz. The ultimate attenuation slope is 12 dB/octave. The filter's response curve is shown in Figure 2−4.

5.68 The circuit has 30 dB of gain, with calibration adjustable via R7. Relays K1 and K2 are energized when a 15-kHz weighted noise measurement is requested, provided MEAS LEVEL is inactive. Selector and bypass control U1, Q1 handles operation of the relays.

5.69 Switch S1 selects the control input signal line which commands filter insertion to be either NOISE MEAS OPT 2 or NOISE MEAS OPT 3. This allows the filter card to be used in either slot 10 or slot 11 of the 8610A. See the installation manual (part number A0086-12-601), page 0086-10-041, sheet 2.

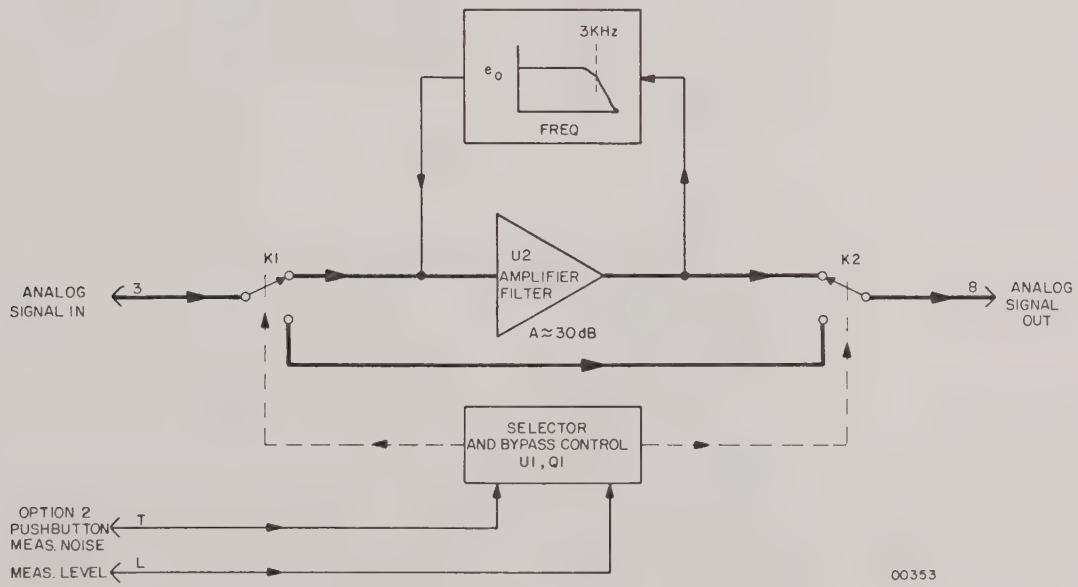


Figure 5−8. Option 4, 3-kHz Filter (Card 10) Block Diagram

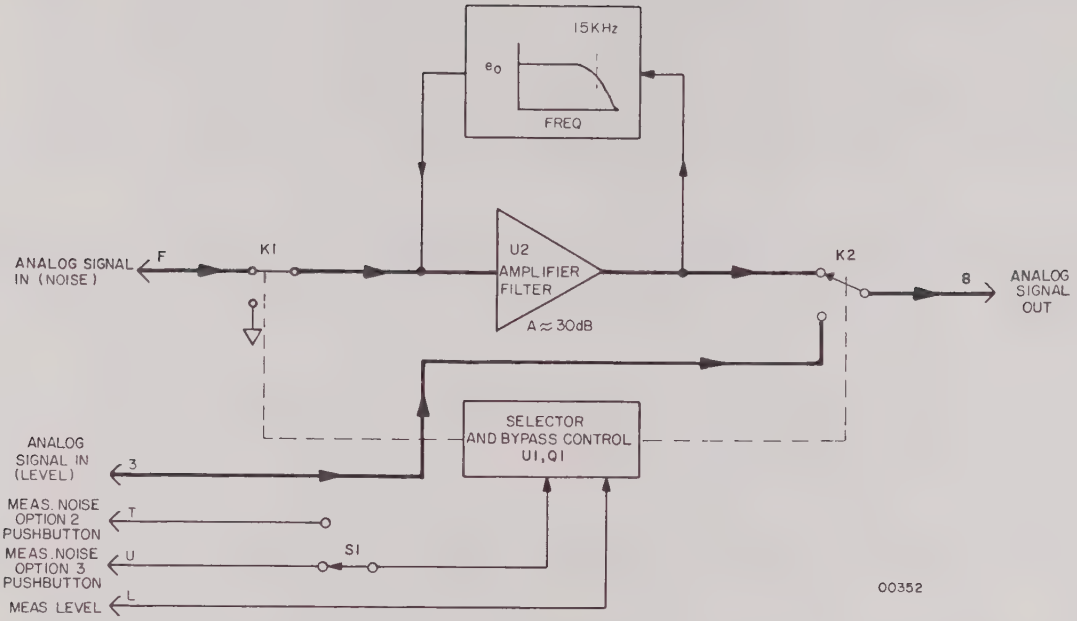


Figure 5—9. Option 7, 15-kHz Filter (Card 10 or 11) Block Diagram

5.70 AC/DC CONVERTER (CARD 13)

5.71 The AC/DC converter card provides gain, automatic gain switching, and ac-to-dc conversion (detection) for all level and noise measurements made by the 8610A. In addition, this card has a sine-to-square wave converter which conditions input signals for proper counting during frequency measurements. Refer to the block diagram of Figure 5—10.

5.72 Amplifier U1 provides approximately 22 dB of gain. However, the U1 stage is preceded by a switchable attenuator which can insert either 0 dB or 30 dB of attenuation. The attenuator is switched in or out by Q1 and relay K1, which are controlled by the output of autoranging circuits on card 12. Relay K1 is operated to remove the 30 dB attenuation whenever ranging card 12 finds that the output of amplifier U1 has fallen below a predetermined threshold.

NOTE

A switchable 20-kHz lowpass filter feedback network is associated with amplifier U1. Transistors Q2, Q3, Q4 determine whether this function will be switched in or out. In the present 8610A, this function is not used, and pin 10 is hard wired to ground to insure that the 20-kHz lowpass function is permanently switched out.

5.73 The ac-to-dc conversion (detection) is performed differently for level and noise inputs being measured. Level measurements employ average detection via the path through diodes U4C and U4D. Noise measurements employ quasi-rms detection via the path including diodes U4A and U4B.

5.74 The averaging detector output is selected when relays K2 and K3 are released. The quasi-rms detector output is selected when relays K2 and K3 are energized.

5.75 Transistors Q5 and Q6 form a cascode amplifier which drives both the level (average) and noise (quasi-rms) detector networks. Transistor Q7 is an emitter follower amplifier which furnishes additional drive for the noise (quasi-rms) detector network. Amplifier U2 is a differential input stage which produces a single-ended dc output suitable for driving ranging card 12 and logarithmic converter card 14.

5.76 Field effect transistors Q8, Q9, Q10, Q11 are used as "dump" switches to discharge certain capacitances in the detection circuits just prior to actual measurements made in the scan mode.

5.77 Transistor Q12 and multi-transistor array U3 form a limiting amplifier with hysteresis and TTL compatible output. This circuit accepts the ac sinewave signal from amplifier U1 and produces a square wave signal . . . with sharp rise and fall transitions . . . suitable for driving the 8610A's counting circuits during frequency measurements.

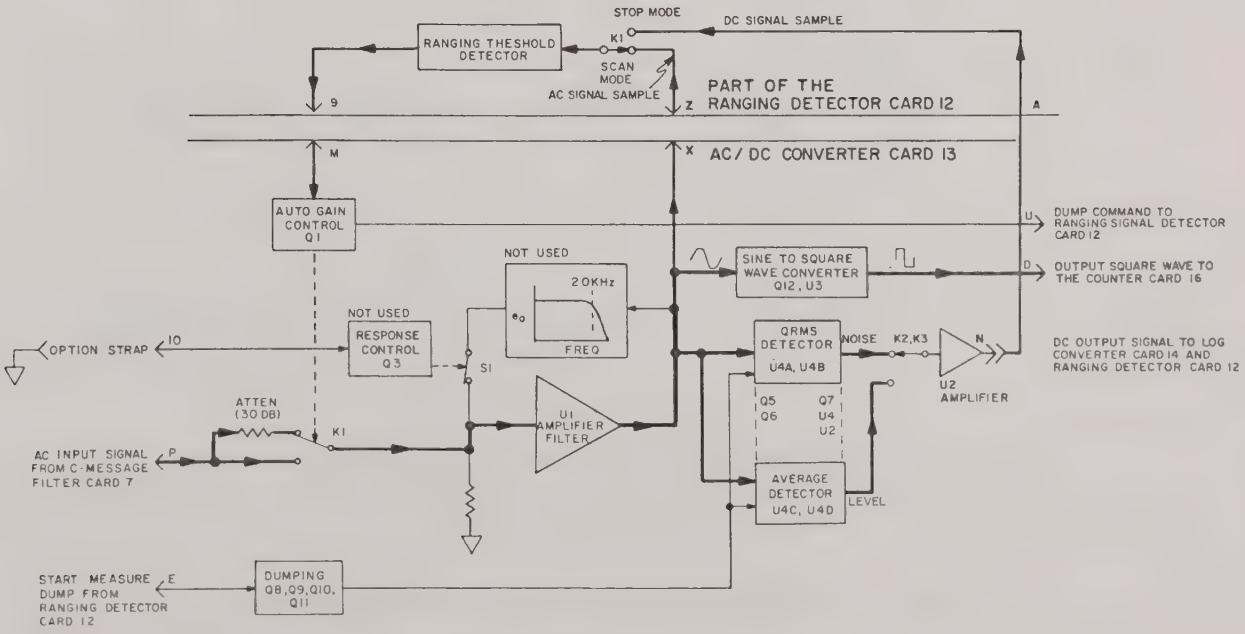


Figure 5—10. AC/DC Converter (Card 13) Block Diagram

5.78 RANGING SIGNAL DETECTOR (CARD 12)

5.79 During scan mode, the ranging signal detector monitors an ac signal sample from AC/DC converter card 13. During stop mode, the ranging signal detector monitors a sample of the dc output signal from the AC/DC converter. The ranging detector determines whether the monitored signal(s) are "in-range" or "out-of-range". Based on the strength of the signal(s) being monitored, the card generates AUTORANGE (HIGH), AUTORANGE (LOW), OUT-OF-RANGE, and OVERLOAD commands which control the 8610A's measurement and data display functions.

5.80 The ranging card also generates START MEASURE DUMP commands during scanning to ensure rapid, accurate measurement recycling of the circuits on AC/DC converter card 13.

5.81 Refer to the block diagram in Figure 5—11 for aid in understanding the following ranging card circuit description.

5.82 In scan mode, peak detector U5, Q4 monitors a sample of the ac measurement signal from AC/DC converter card 13. If the peak detected level of this signal should fall outside preset high and low range limits, an automatic gain ranging command (either HIGH or LOW) is generated by ranging threshold comparator U2 and flip-flop U3.

5.83 These commands control the sensitivity (gain) of AC/DC converter card 13 and also the gain of logarithmic converter card 14. The gain control action will change in the direction which tends to bring the signal being measured within the 8610A's optimum measurement dynamic range.

5.84 During stop mode, the gain control action is essentially similar, except the monitored signal is a sample of the dc voltage output of AC/DC converter card 13 rather than the sample ac signal output that card. Relay K1 on ranging card 12 determines whether the ac sample (scan mode) or the dc sample (stop mode) will be used for autoranging (energized K1 = ac sample, released K1 = dc sample).

5.85 Should a signal sample amplitude ever exceed maximum high or low boundaries established for the 8610A, this fact is sensed by out-of-range comparators U1. The comparators, together with flip-flop U4 and gates U6, will then initiate an OUT-OF-RANGE output that extinguishes (blanks) all readout units.

5.86 If an out-of-range overload condition occurs on the upper (high) end of the measurement range, then an OVERLOAD signal will appear at the output of ranging detector card 12. The OVERLOAD signal is applied to input amplifier and C-message filter card 7, where an overload clamp circuit responds by shorting the measurement signal path to ground. This action protects the 8610A measurement circuits from possible damage if an excessively large signal is ever present at a measurement input port.

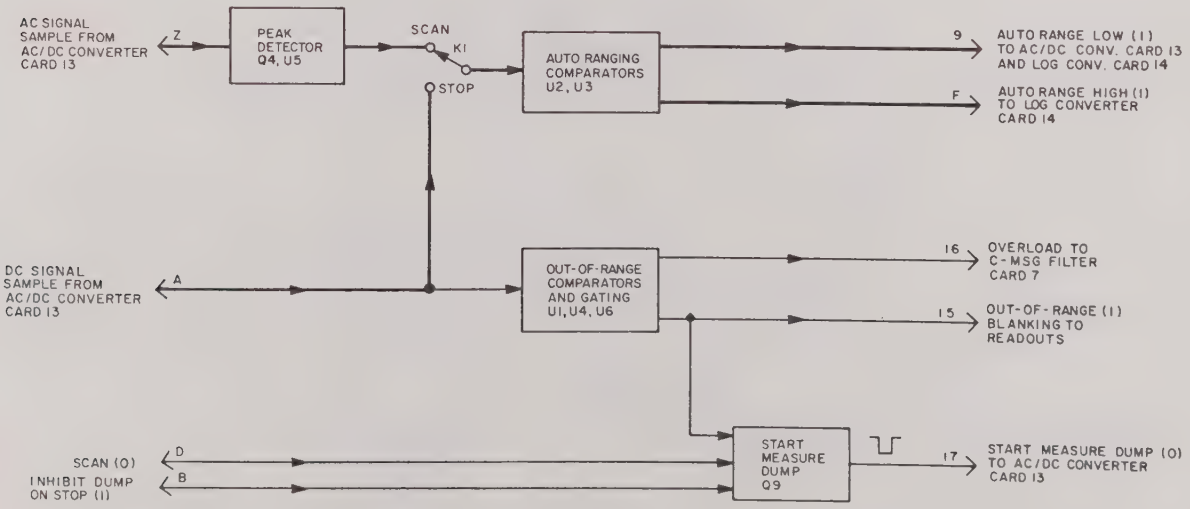


Figure 5—11. Ranging Signal Detector (Card 12) Block Diagram

5.87 At the start of each measurement in the scan mode, the ranging detector card generates a START MEASURE DUMP signal. This signal forces discharging of capacitors in the quasi-rms (noise) and average (level) detector circuits on AC/DC converter card 13. The dumping action enables rapid, accurate measurement recycling. When an OVERLOAD condition is present, the dump command is held continuosly present.

5.88 LOGARITHMIC CONVERTER (CARD 14)

5.89 Log converter card 14 receives as input a dc voltage linearly proportional to the level or noise being measured by the 8610A. Card 14 converts this input into a dc voltage output which is **logarithmically** proportional to the level or noise being measured. This linear-to-log conversion is performed so that the 8600 system readouts will show measurement results in logarithmic units (dBm or dBrn).

5.90 Log converter card 14 also has an amplifier stage with selectable gain to perform autoranging as directed by control signals from ranging detector card 12.

5.91 Refer to Figure 5—12 for a simplified block diagram of log converter card 14. The log conversion is performed by a diode-type function generator in the form of a transistor (U3) junction within the negative feedback loop of wideband voltage amplifier U1, U2.

5.92 One stage of fixed voltage gain is provided by U4, between the log circuit and the autoranging gain-controlled amplifier U5.

5.93 Amplifier U5 employs programmable negative feedback to perform the autorange gain-changing function. AUTORANGE (HIGH) and AUTORANGE (LOW) signals are decoded by the autorange control logic block on Figure 5—12. Outputs of the control logic block are used to drive the autoranging gain switching circuitry K1, K2, K3. These relays switch the gain of amplifier U5, thereby altering overall gain of the log converter card.

5.94 An out-of-range function is performed by the driver gates in U7. Out-of-range information from external measuring equipment, or from AC/DC converter card 13, is gated into an out-of-range output from U7.

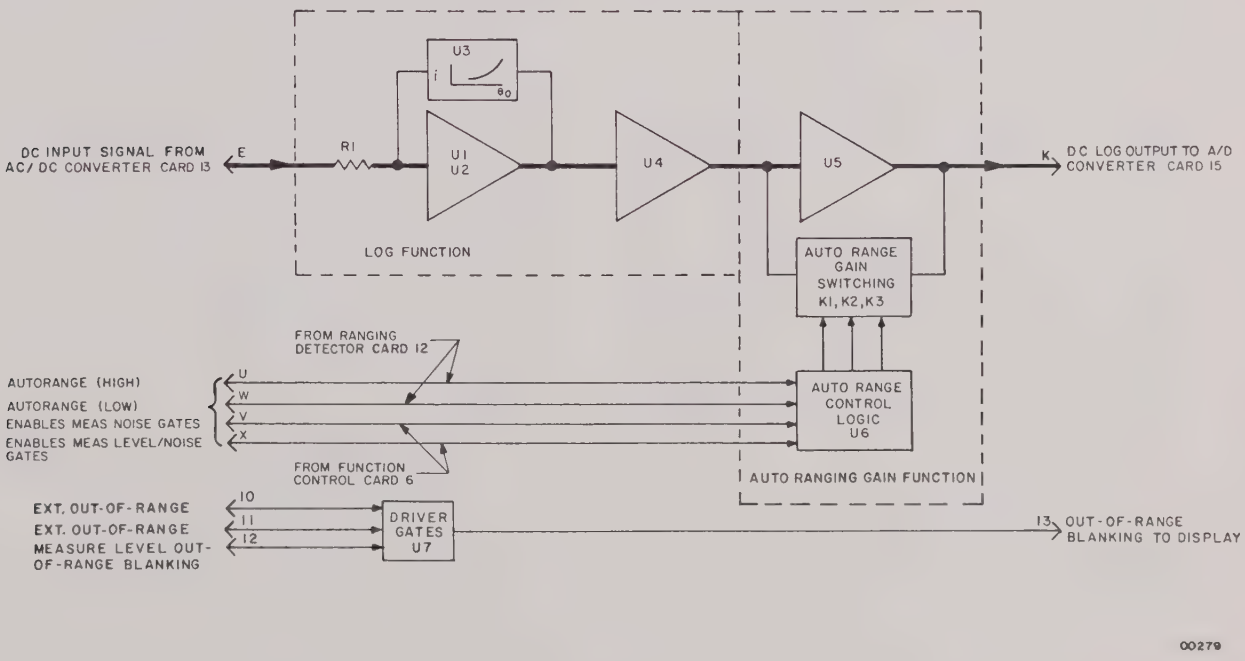


Figure 5—12. Logarithmic Converter (Card 14) Block Diagram

5.95 A/D CONVERTER (CARD 15)

5.96 A/D converter card 15 controls the process used by the 8610A to convert a level or noise measurement dc analog voltage into digital data suitable for display on system readout unit(s). Refer to the block diagram of Figure 5—13 for aid in understanding the A/D converter card circuit description.

NOTE

In Figure 5—13, switches S1 and S2 are shown as mechanical switch symbols. In reality, these switches are field effect transistors (FET's).

5.97 The analog-to-digital (A/D) conversion is performed by a dual-slope integration process. Figure 5—13 shows the A/D converter card circuits in up-slope integrating mode. At this time:

☐ A MEASURE LEVEL/NOISE command has, via relay K1, selected an appropriate integrating capacitor . . . either C3 for noise or C10 for level;

☐ Switch S1 has been set to begin accepting the dc analog voltage input for integration.

☐ The digital counting circuits on counter card 16 have begun to receive on appropriate clock frequency input . . . either 100 kHz for noise or 250 kHz for level.

5.98 Under these conditions, the integrating capacitor begins to accumulate a charge. The polarity (±) of the accumulating charge (appears as voltage across the integrating capacitor) depends on the magnitude of the dc analog input and on the type of measurement. Remember that the 8600 system displays level measurements above 0.0 dBm with a plus (+) polarity indication, and level measurements below 0.0 dBm with a minus (−) polarity indication.

5.99 The charging continues until counting circuits on counter card 16 have reached a count status of 10,000 (count 10,000 = 10^4 SPILLOVER). When this count is reached, the 10^4 SPILLOVER signal appears as input to A/D converter card 15.

5.100 The 10^4 SPILLOVER signal results in switch S1 changing state. This: (a) disconnects the integrator from the incoming dc analog voltage, and (b) starts discharge of the integrating capacitor into either resistor R15 or R12, as selected by switch S2.

5.101 The state of switch S2 depends on the polarity (±) of the charge accumulated when integrating the dc analog input. The counter, gate, and polarity detector block shown on Figure 5—13 automatically switches S2 to a resistor discharge path which has a polarity opposite that of the accumulated charge. Thus, the discharge is actually integration in a polarity (±) direction opposite to that in which the capacitor was charged by the dc analog voltage. This is the down-slope portion of the dual-slope integration technique.

NOTE

The polarities (±) supplied to discharge resistors R15 and R12 are produced by precision voltage reference source U6 on the A/D converter card.

5.102 While the integrating capacitor on A/D converter card 16 is discharging, the circuits on counter card 16 are again counting up from zero. (The counter assumed a zero count condition when 10^4 SPILLOVER occured.) The 100-kHz clock rate is used for noise measurements. The 250-kHz clock rate is used for level measurements.

5.103 When the integration capacitor on card 16 discharges to the point where the output of integration amplifier U4 crosses zero volts, this event is recognized by the transfer generator U3, U7 block shown on Figure 5—13. This causes the transfer generator to produce an output TRANSFER PULSE.

5.104 The time taken for down-slope integration (discharge) is proportional to the dc analog measurement voltage which was present during up-slope integration (charge). Since counter card 16 started counting up from zero at the instant discharge began, the counter status when TRANSFER PULSE occurs is a digital representation of the measurement result. That is, the count status conveys the amplitude of the measured analog voltage.

5.105 The TRANSFER PULSE output of A/D converter card 15 is applied to the 8610A's dual line cards 1, 2, 3, 4 via scanner card 5. This causes the active dual line card to command transfer of counter card 16 status to associated readout unit(s). Thus, the measurement result digital data from counter card 16 will appear as the digital display on the readout unit(s). On scanner card 5, the TRANSFER PULSE forces resumption of scanning in search of another measurement request.

5.106 It should be noted that the counter, gate, polarity detector block on A/D converter card 15 produces a polarity (±) output signal which is forwarded to function control card 6. This illuminates the correct polarity (±) indication on the readout unit displaying the measurement result.

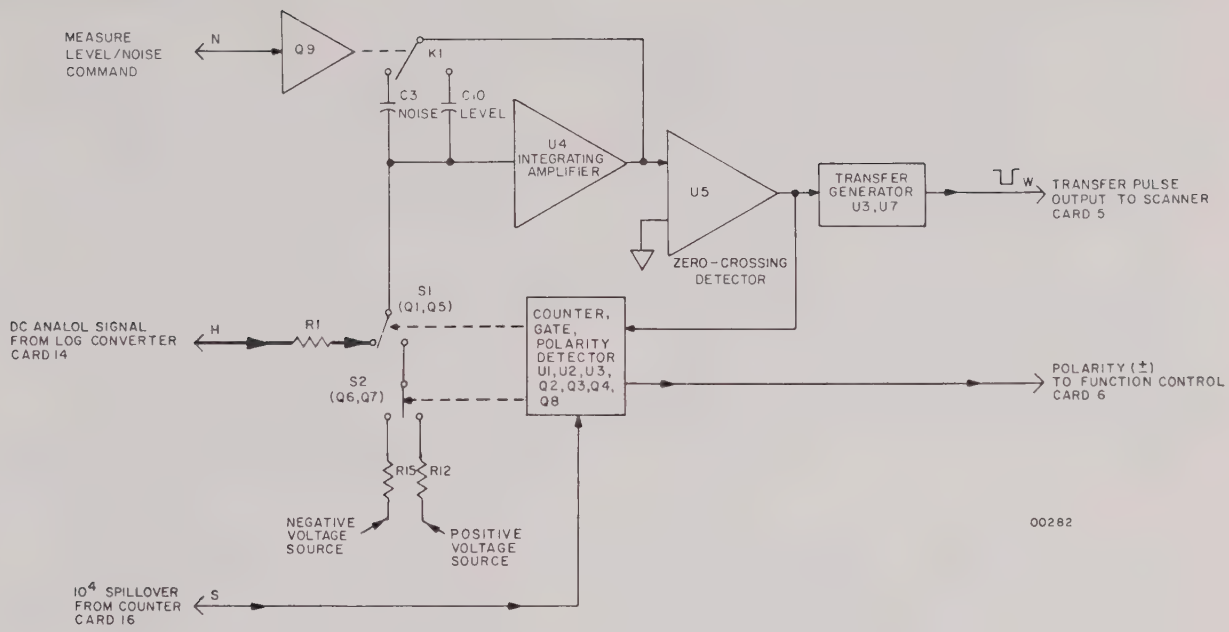


Figure 5—13. A/D Converter (Card 15) Block Diagram

5.107 COUNTER (CARD 16)

5.108 Counter card 16 is an integral part of the analog-to-digital conversion process which produces digital readout of level and noise measurement results. Also, the counter card itself is responsible for frequency measurements, including frequency measurement autoranging with automatic decimal point positioning.

5.109 The role played by counter card 16 during level and noise measurements is covered as part of the A/D converter card 15 circuit description. Refer to paragraphs 5.95 through 5.106 for this information.

5.110 The counter card's role during frequency measurements is described below. Refer to the block diagram of Figure 5—14.

5.111 At the start of a frequency measurement, the frequency ranging logic U4 block on Figure 5—14 is in its lowest range (set for up to 9.999 kHz input signal). This furnishes a one-second gate signal to input gating block U10, U11. That is, the incoming signal to be measured will be counted for one second to determine the signal frequency.

5.112 If at any time during the one-second interval, more than 9,999 counts accumulate in counter U1, U2, U3, U6 then a 10^4 SPILLOVER will be produced by the counter. The 10^4 SPILLOVER will cause range control logic U5, U8, U9 to advance frequency ranging logic U4 by one increment. This operation selects a new frequency count gate time of 100 milliseconds (0.1 second) thus establishing a new frequency measurement range of 10.00 to 99.99 kHz.

5.113 If a 10^4 SPILLOVER occurs during this range also, then frequency ranging logic U4 will be advanced to select a frequency count gate time of 10 milliseconds (0.01 second). This operation will establish a new frequency measurement range of 100.0 kHz and up.

5.114 When an appropriate range has been achieved, as indicated by completion of a frequency count gate without 10^4 SPILLOVER, then range verification U7, U10, U11 is activated by input gating U10, U11. This results in a TRANSFER PULSE output to mark the availability of frequency measurement data.

5.115 The TRANSFER PULSE is applied to the 8610A's dual line cards 1, 2, 3, 4 via scanner card 5. This causes the active dual line card to command transfer of the counter card 16 status to associated readout unit(s). Thus, the frequency measurement result data from counter card 16 will appear on the digital display of the readout unit(s). On scanner card 5, the TRANSFER PULSE forces resumption of scanning in search of another measurement request.

5.116 Note that the range control logic U5, U8, U9 block on Figure 5—14 produces outputs which convey the decimal point location which should be displayed by the readout unit(s) along with the frequency measurement data. The decimal point information is conveyed to the readout unit(s) via encoding on function control card 6.

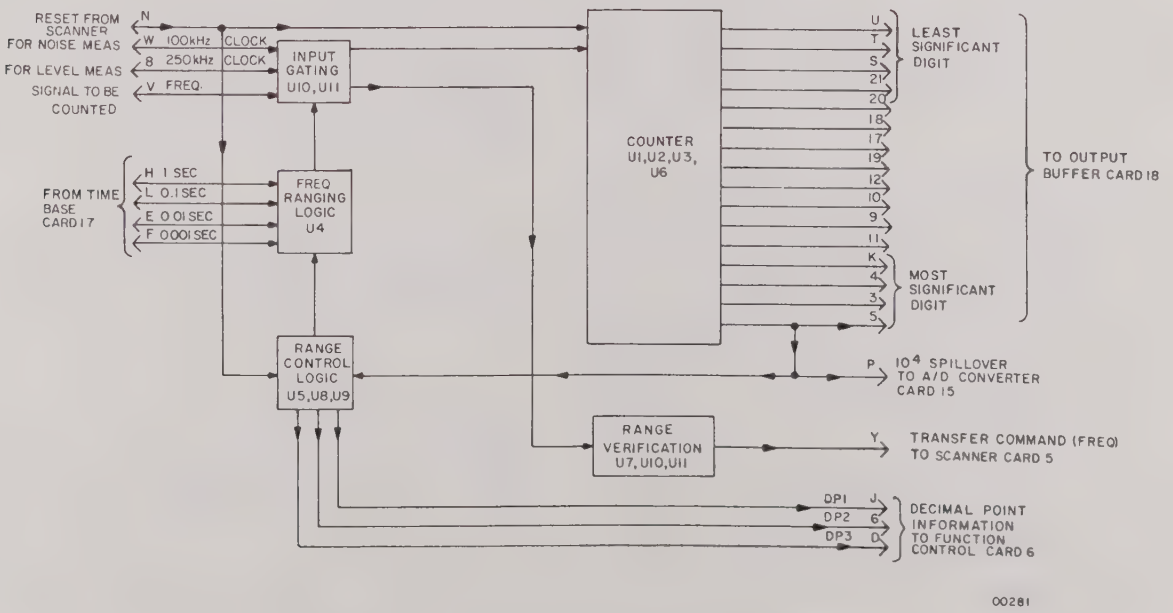


Figure 5—14. Counter (Card 16) Block Diagram

5.117 TIME BASE (CARD 17)

5.118 Time base card 17 has two independent functions as follows.

☐ A crystal oscillator and digital counter chain produces all the different clock signals used by the 8610A measurement and data display functions.

☐ An array of gates controls transfer of digital measurement data from counter card 16 to output buffer card 18.

5.119 Refer to Figure 5—15 for a block diagram of time base card 17. The different clock signals are generated by 1-MHz crystal oscillator Q3, Q4 and seven digital counters (U1 through U7) in a divide chain. The clock signals are extracted from different points along the chain, thereby creating six different (but synchronous) clock signals. The 5-kHz and 0.5-kHz signals are inverted by Q1 and Q2 respectively.

5.120 The data block gates U8, U9, U10, U11 on Figure 5—15 are designed to control transfer of measurement digital data from counter card 16 to output buffer card 18. DATA BLOCK is the control signal (high = transfer, low = no transfer).

5.121 This transfer gating function is intended for use in potential future expansion of 8600 system capabilities, and is not presently active. That is, DATA BLOCK is hard-wired to logic high, thus permanently fixing the gating in the transfer state. (It should be noted that data bits are logically inverted by transfer through the gating block.)

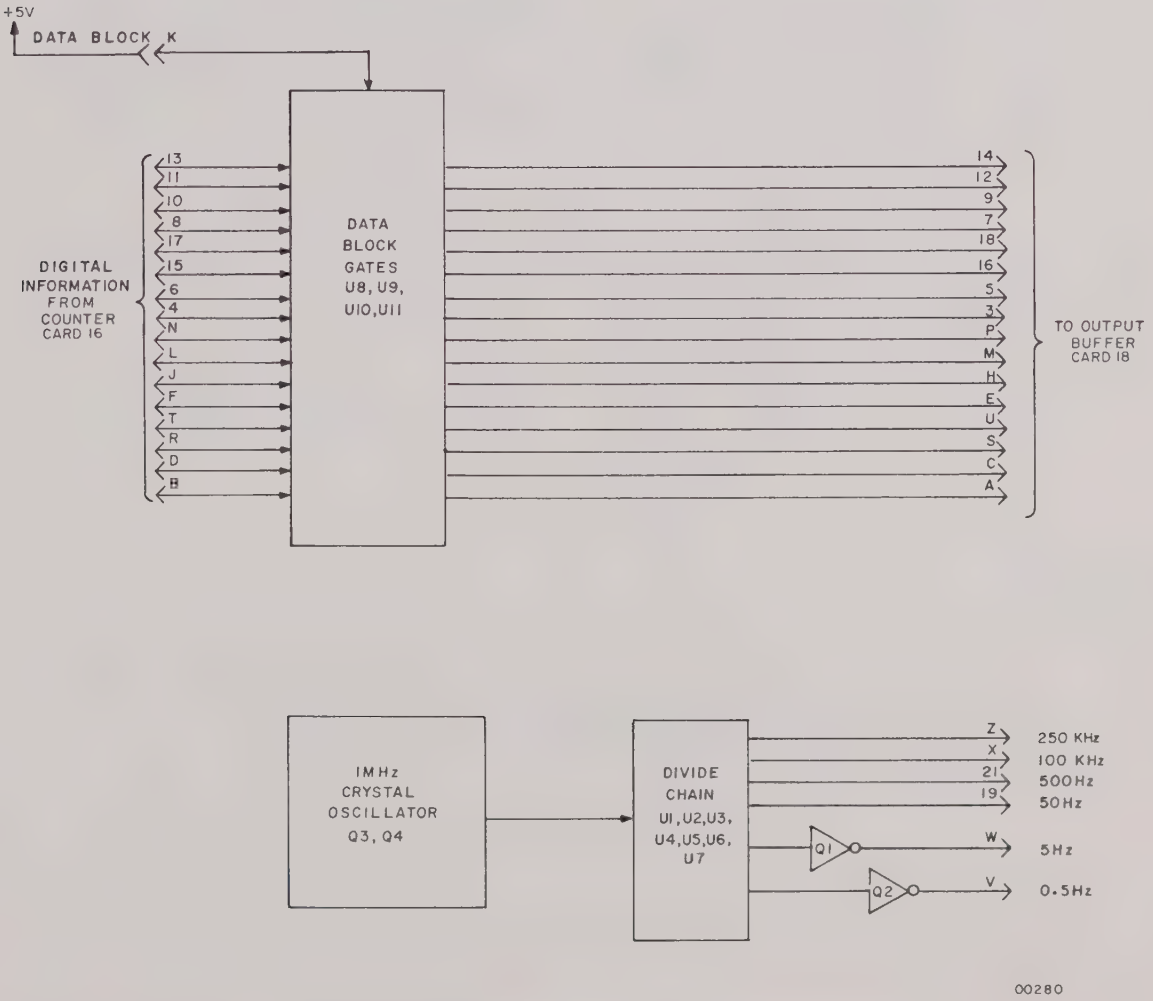


Figure 5—15. Time Base (Card 17) Block Diagram

5.122 OUTPUT BUFFER (CARD 18)

5.123 Output buffer card 18 is an interface for measurement information transfer from the 8610A to the system's readout units. A block diagram of the output buffer card is shown in Figure 5—16.

5.124 Digital information from the 8610A's measurement functions is presented in BCD-coded form to output line drivers U1 through U10. Transfer of data through the line drivers is controlled by transfer gate U11. Data is transferred through the line drivers without inversion. The data is represented by active low states at the card input and has active low states at the card output. That is, the input data is in complemented form and so is the output data.

5.125 Note that the transferred information comprises:

☐ Four digits of four-bit BCD-coded measurement result data from time base card 17;

☐ Four bits of measure code information conveying polarity(±), decimal point, and type-of-measurement data from function control card 6.

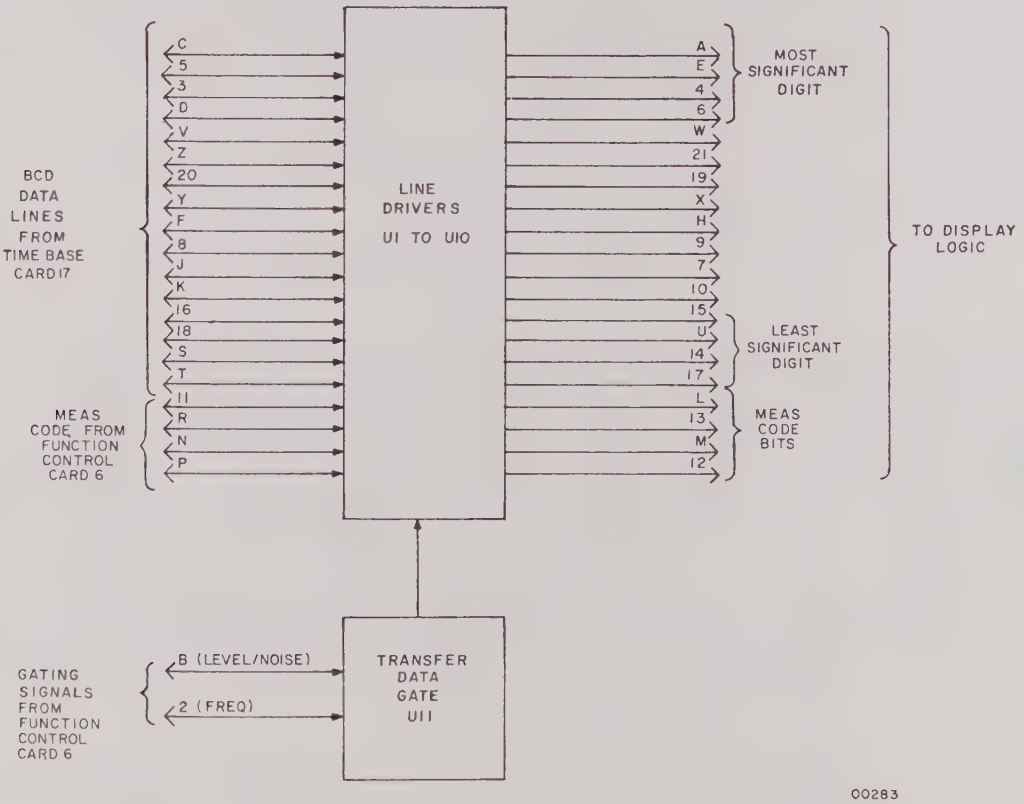


Figure 5—16. Output Buffer (Card 18) Block Diagram

5.126 EXTERNAL RECORDER BUFFER (OPT 6)

5.127 An optional recorder buffer card is available to provide necessary isolation between the 8610A and an external recorder. The card provides 4-bit, BCD-coded data outputs via open-collector gates.

5.128 The output data is in uncomplemented form (active high states), and is TTL compatible to systems employing +5 volt logic high levels referenced to ground. Output current capability is 1 mA maximum for logical 1 and 16 mA sinking capability for logical 0.

5.129 When the 8610A is equipped with this option, the data is available at the 8610A's EXTERNAL RECORDER jack J19.

5.130 POWER SUPPLY (MODEL 8620)

5.131 The Model 8620 power supply is physically located within the 8610A central measurement unit. The power supply furnishes not only voltages needed in the 8610A, but also voltages needed to operate the system's readout units. Refer to the power supply block diagram of Figure 5–17.

NOTE

A commercial version of the 8620 power supply may be present in later 8610A production units.

5.132 The supply operates from a regular 48 Vdc office battery source and produces outputs of +10 Vdc, +12 Vdc, −12 Vdc, +5 Vdc, and +215 Vdc.

5.133 Input filter L1, L9 removes spurious noise, hum, and transient signals from the 48 Vdc office battery input. The filter also prevents spurious signal leakage backward from the 8610A onto the office battery supply.

5.134 Inverter Q1, Q2, T1, L3 performs dc-to-ac conversion by chopping the 48 Vdc office battery input. Transformer T1 supplies 3 different ac voltages to the power supply's rectifier circuits. The +10 volt rectifier, the +18.5 volt rectifier, and the +215 volt rectifier are all full-wave diode bridge types.

5.135 The +215 volt rectifier output is unregulated. It is filtered by choke L4 plus associated shunt capacitors. The +215 Vdc output is distributed for use in powering the Nixie-type digital display tubes in readout units driven by the 8610A. A 0.5 ampere fuse F3 provides overcurrent protection.

5.136 The +10 volt output is unregulated. It is filtered by chokes L2, L5 and associated filter capacitors. The +10 Vdc output is distributed for use in powering circuits within the readout units attached to the 8610A. It is also the input source for the power supply's +5 Vdc regulator. A 10 ampere fuse F1 provides overcurrent protection on the distribution path to the readout units.

5.137 The +5 volt regulator comprises series pass transistor Q3 plus reference source, sensing, and drive components U1, Q2. The +5 volt output is filtered by choke L6 and associated shunt capacitors. The +5 Vdc output is distributed to power the logic circuits within the 8610A. A 5 ampere fuse F2 provides overcurrent protection. The regulated +5 volt output of Q3 also serves as a reference for the ±12-volt regulators.

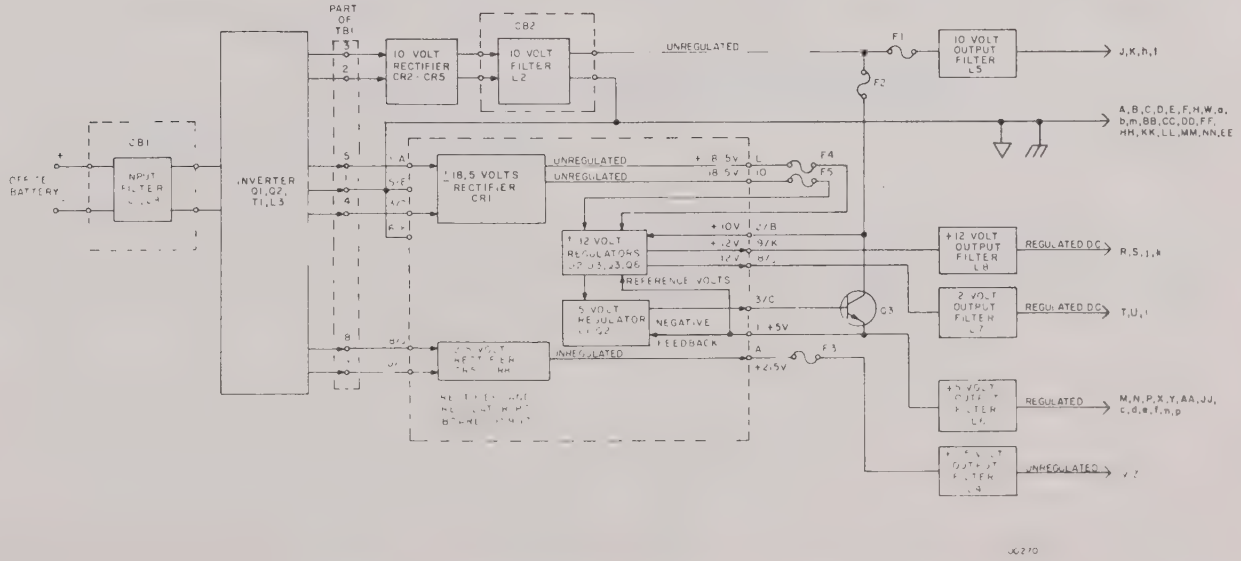


Figure 5–17. Model 8620 Power Supply Block Diagram

5.138 The +12 volt regulator comprises series pass transistor Q6, sensing amplifier U3, and driver Q5. The +12 volt output is filtered by choke L8 and associated shunt capacitors. The +12 Vdc output is distributed to various analog circuits within the 8610A. A 0.5 ampere fuse F4 provides overcurrent protection.

5.139 The −12 volt regulator comprises series pass transistor Q4, sensing amplifier U2, and driver Q3. The −12 volt output is filtered by choke L7 and associated shunt capacitors. The −12 Vdc output is distributed to various analog circuits within the 8610A. A 0.5 ampere fuse F5 provides overcurrent protection.

5.140 MODEL 8630/8631/8632 READOUT UNIT CIRCUIT DESCRIPTIONS

5.141 All three of these models are single readout units with essentially identical electrical design. The 8630 and 8631 are "aisle-mount" types, in very compact packages designed for installation on brackets attached to frames, racks, or overhead supports. The 8632 is a 19-inch rack-mount version.

5.142 The 8630 is an end-connect unit, for use alone on any 8610A output port or for use to end a chain of parallel-connect type readouts on any 8610A output port.

5.143 The 8631 is similar, except it is a parallel-connect type for use as an intermediate readout in a chain on any 8610A output port. This unit has a thru-connector for passing along signal lines to other readouts in the chain.

5.144 The 8632 is identical to the 8630, excpet that the 8632 is designed for mounting in a 19-inch rack.

5.145 Since all three models have the same electrical design, only one (the 8630) will be described in the following paragraphs. Refer to Figure 5−18, the 8630 block diagram.

5.146 The readout unit has Nixie-type digital readout tubes which present a visual display of measurement data from the 8610A. The circuits are contained on two printed circuit cards within the readout unit. These are:

- ☐ Readout card PC1 (95797), and
- ☐ Decoder card PC2 (95798).

The functions of these two cards are interrelated; the connections between them are shown in the block diagram of Figure 5−18.

5.147 Display info latches/decoders/drivers U1-U8 receive BCD-coded measurement data from output buffer card 18 of the 8610A. Data is strobed into the readout unit latches on receipt of a TRANSFER PULSE from the 8610A.

5.148 Data stored in the latches is automatically decoded from BCD to decimal form in order to drive the digit cathodes of Nixie-type readout tubes DS5-DS8.

5.149 Measure code latches U9-U11 shown on Figure 5−18 receive a 4-bit measure code (polarity, decimal point, type-of-measurement) from the 8610A output buffer card 18. (The measure code actually originates on function control card 6 in the 8610A.)

5.150 The measure code bits are strobed into latches on receipt of TRANSFER PULSE from the 8610A. When stored in the latches, the 4-bit measure code is automatically presented to decoder U1. The decoded measure information is applied to function gating CR1-CR12, U2-U5, Q1. The function gating circuits are thus directed to select/control:

- ☐ Anode gating Q5-Q12 which enables the appropriate Nixie tube(s) to display the measurement data. (This function includes leading zero blanking.)
- ☐ Polarity control Q1-Q4 which enables the plus (+) or minus(−) sign (or neither).
- ☐ Decimal lamps DS1-DS3, which automatically illuminate a decimal point in the correct position amid the digits of a measurement result being displayed.

5.151 If an OUT-OF-RANGE signal should be received from the 8610A along with TRANSFER PULSE, the out-of-range indication is strobed into blanking latch U10, Q15, Q16. This causes blanking of the entire readout display.

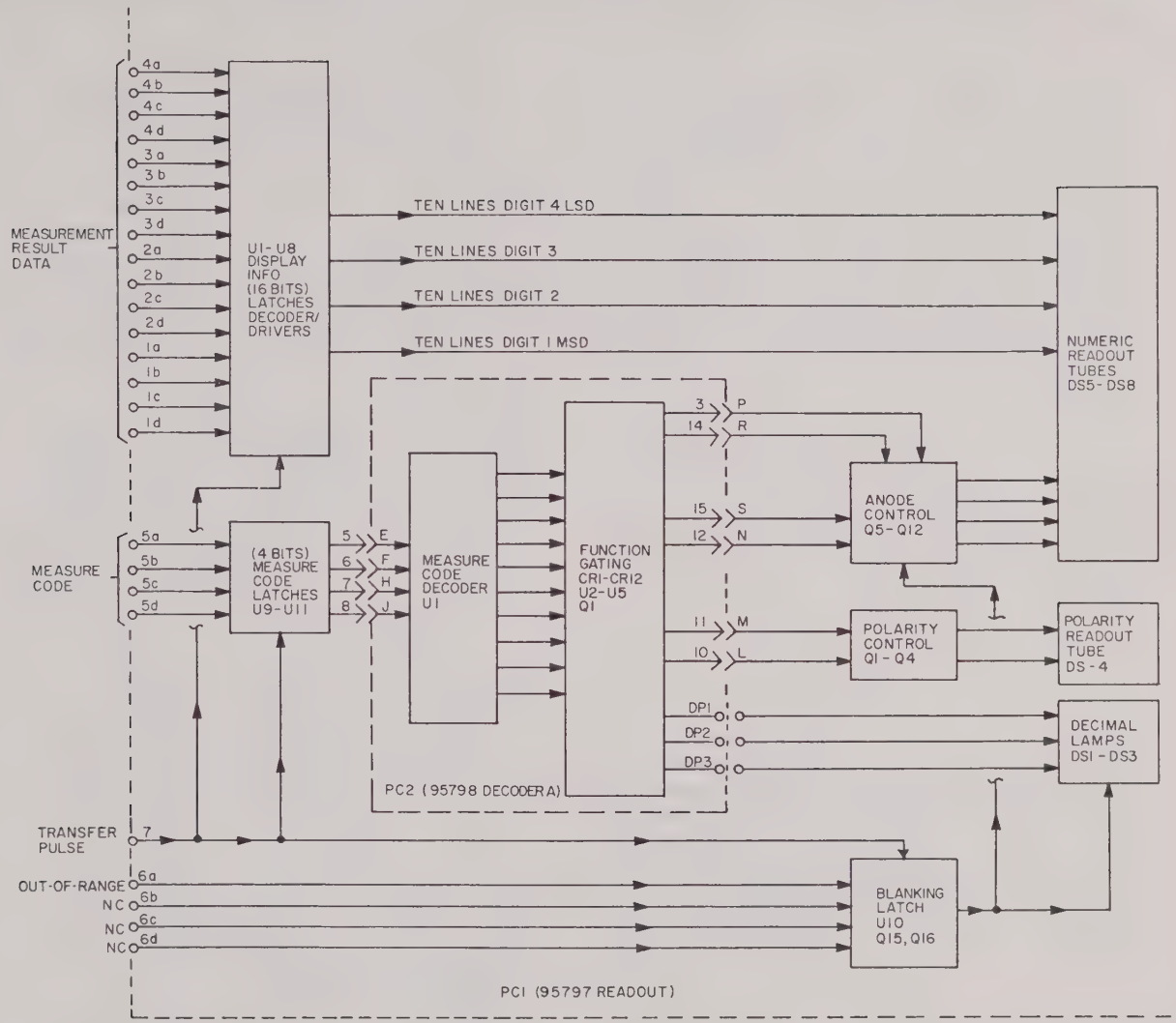


Figure 5—18. Model 8630 Readout Unit Block Diagram

5.152 MODEL 8640/8641 DUAL READOUT UNIT CIRCUIT DESCRIPTION

5.153 Both models are dual readout units capable of simultaneously displaying level and frequency measurement results. Both models have essentially identical electrical designs. They differ only in mechanical configuration.

5.154 The 8640 is an "aisle-mount" type, in a compact package designed for installation on a bracket attached to a frame, rack, or overhead support. The 8641 is a rack-mount version designed for use in 19-inch bays. Both are end-connect types for use alone on an 8610A output port.

5.155 Operation of the dual readouts is similar to operation of single readouts like the 8630/8631/8632 types described in paragraphs 5.140 through 5.151. The main difference is that dual readouts contain two sets of printed circuit cards. That is, dual readouts contain two each of:

- ☐ Readout card PC1 (95797), and
- ☐ Decoder card PC2 (95798).

5.156 A small additional card, frequency display inhibit logic PC3 (96146) controls strobing of incoming measurement data. Both sets of cards monitor a single set of incoming data and control signal lines. When level measurement information is present on these lines, the appearance of a TRANSFER PULSE strobes the information into latches which service the level display protion of the dual readout.

5.157 Likewise, when frequency measurement information is present on the input lines with a TRANSFER PULSE B, logic in the dual readout unit strobes the information into latches which service the frequency display portion of the dual readout unit.

5.158 MODEL 8650/8651 ACCESS UNIT CIRCUIT DESCRIPTION

5.159 Both models are essentially identical in electrical design. The 8650 is an end-connect type for use alone on any 8610A input port, or for use at the end of a parallel-connect type access unit chain on any 8610A input port.

5.160 The 8651 is similar in every way, except it is a parallel-connect type for use as an intermediate access unit in a chain on any 8610A input port. This unit has a thru-connector for passing along (busing) tip/ring and control lines to/from other access units in the chain.

5.161 The access units provide for connection of telephone circuits under test to the 8600 system. The access units allow selection of appropriate test impedances, 600 or 900 ohms terminating, or approximately 15 kohms bridging. Each access unit has a set of pushbuttons for selecting type of measurement desired, and type of filter to be used during the measurement. Refer to the block diagram of Figure 5—19.

5.162 The TIP/RING leads of a telephone circuit to be tested can be plugged into either 309 jack J2 or 310 jack J3. The impedance selection block on Figure 5—19 includes the pushbuttons and impedance network components for 600-ohm termination, 900-ohm termination, and high-impedance bridging.

5.163 The measure function and measure option blocks on Figure 5—19 include the pushbuttons that produce logic signal outputs which correspond to selected measurement functions. The system function block on Figure 5—19 includes the pushbuttons that produce logic signal outputs which select either the scan or stop modes of system operation. The SCAN LOCKOUT switch is also associated with this block.

5.164 The C-notch function stands alone. It reacts to use of 1010 Hz NOTCH pushbutton S7 by producing a logic signal which inserts a 1010-Hz notch filter in the 8610A measurement path.

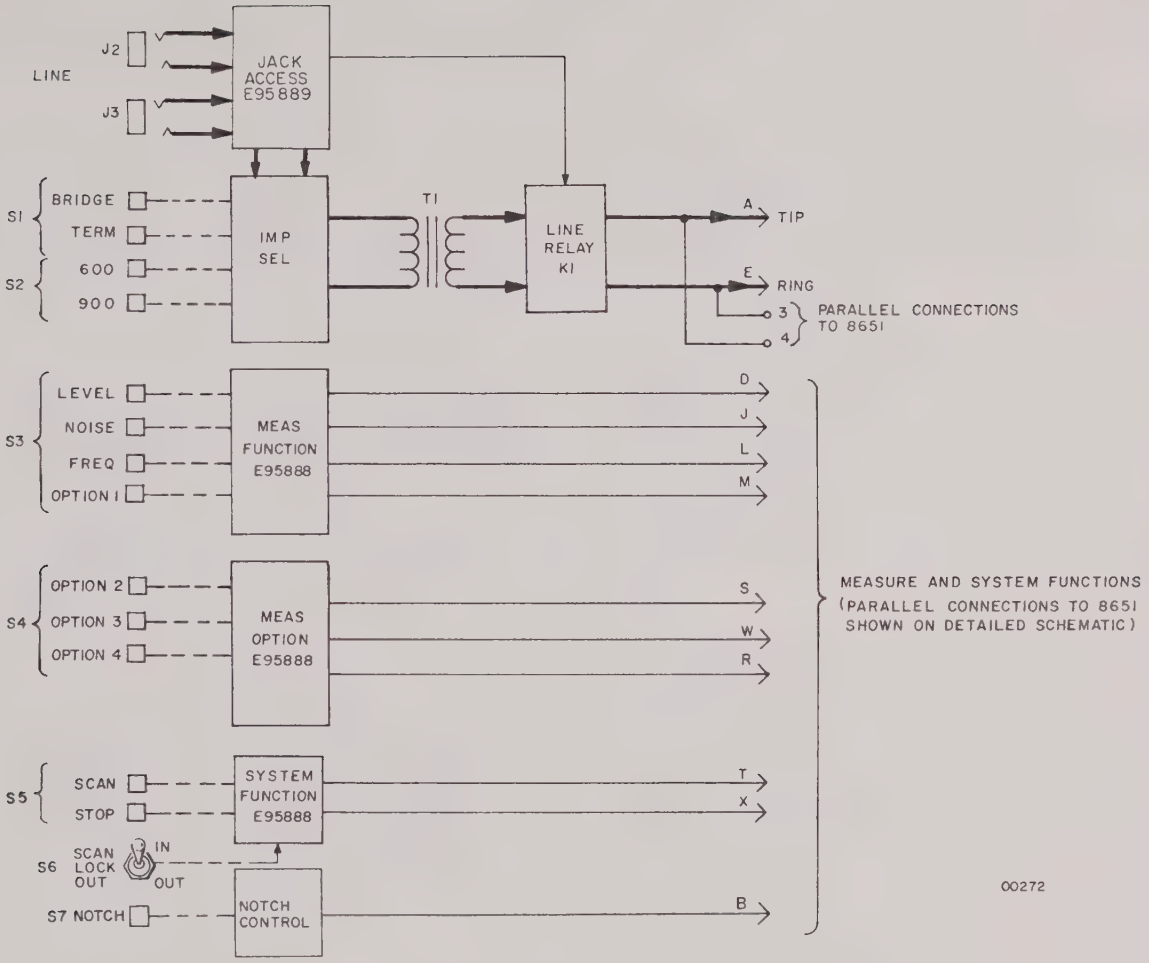


Figure 5—19. Model 8650/8651 Access Unit Block Diagram

SECTION 6

CALIBRATION

6.1 This section is divided into three major parts as follows:

☐ Initial Accuracy Check and Calibration (paragraph 6.2)

☐ Periodic Accuracy Check And Calibration (paragraph 6.4)

☐ Post Maintenance Calibration (paragraph 6.7)

6.2 INITIAL ACCURACY CHECK AND CALIBRATION

6.3 To make an initial accuracy check, perform the following steps. (See Figure 6--1 item 19 relative to the position of switch S1.)

NOTE

The 8600 system, including the 8610A-CN plus all associated access and readout units, has been calibrated at the factory before shipment. Recalibration should not be necessary at time of installation. The following steps will check that the calibration is still okay, and reveal whether any calibration touch-up is needed.

1. Turn system on and allow a two-hour warm-up period to insure system stability before attempting to check accuracy.

2. Apply a 0 dBm ± 0.01 dB (600-ohms) signal at 1 kHz to the input of an access unit. Press access unit's 600, TERM, and LEVEL buttons. Stop the system scanning by pressing STOP button on the access unit. Observe a reading of 0.0 dBm ± 0.1 dB on a readout unit. A reading of 0 dBm is indicated when the readout's plus (+) and minus (−) signs are flashing back and forth. A plus or minus sign indicates level to be within ±0.05 dB of 0 dBm. If necessary, adjust CAL TERM control on the access unit to obtain flashing plus and minus signs on the readout.

3. Terminate the input signal to the access unit with a precision 600-ohm load, then press the access unit's BRDG button. Observe a reading of 0.0 dBm ± 0.1 dB on a readout unit. If necessary, adjust the access unit's CAL BRDG control to obtain flashing plus and minus signs on the readout.

4. Remove the 600-ohm precision load. Apply a 0 dBm ± 0.01 dB (900-ohms) signal at 1 kHz to the input of the access unit. Press access unit's 900 and TERM buttons. (LEVEL button should already be pressed.) Observe readout of 0.0 dBm ± 0.1 dB. If necessary, adjust R7 (900 OHM CAL) control (accessible through top cover of access unit) to obtain flashing plus and minus signs on the readout. .This adjustment requires partial withdrawal of the 8650 type access unit from its mounting rack.

5. Apply a −20 dBm ± 0.1 dB signal (900 ohms) at 1 kHz to the access unit input. Press the access unit's NOISE button. Observe 70 dBrn ± 1 dB on the readout unit. Change input signal to −60 dBm ± 0.1 dB and observe readout of 30 dBrn ± 1 dB. If readings are incorrect, noise measurement calibration touch-up is required (refer to paragraphs 6.4 and 6.7 for the procedures).

6. Repeat steps 2 through 5 above for each access unit used in the 8600 system.

NOTE

The access unit calibration controls referenced in the above procedure are precision adjustments with ranges restricted to approximately:

- ☐ ±0.3 dB for CAL TERM control;
- ☐ ±0.2 dB for CAL BRDG control;
- ☐ ±0.1 dB for 900 OHM CAL (R7 control.

Do **not** attempt to correct for more than ±0.1 dB error. Errors larger than ±0.1 dB usually indicate electronic problems or need for recalibration within the 8610A-CN central measurement unit.

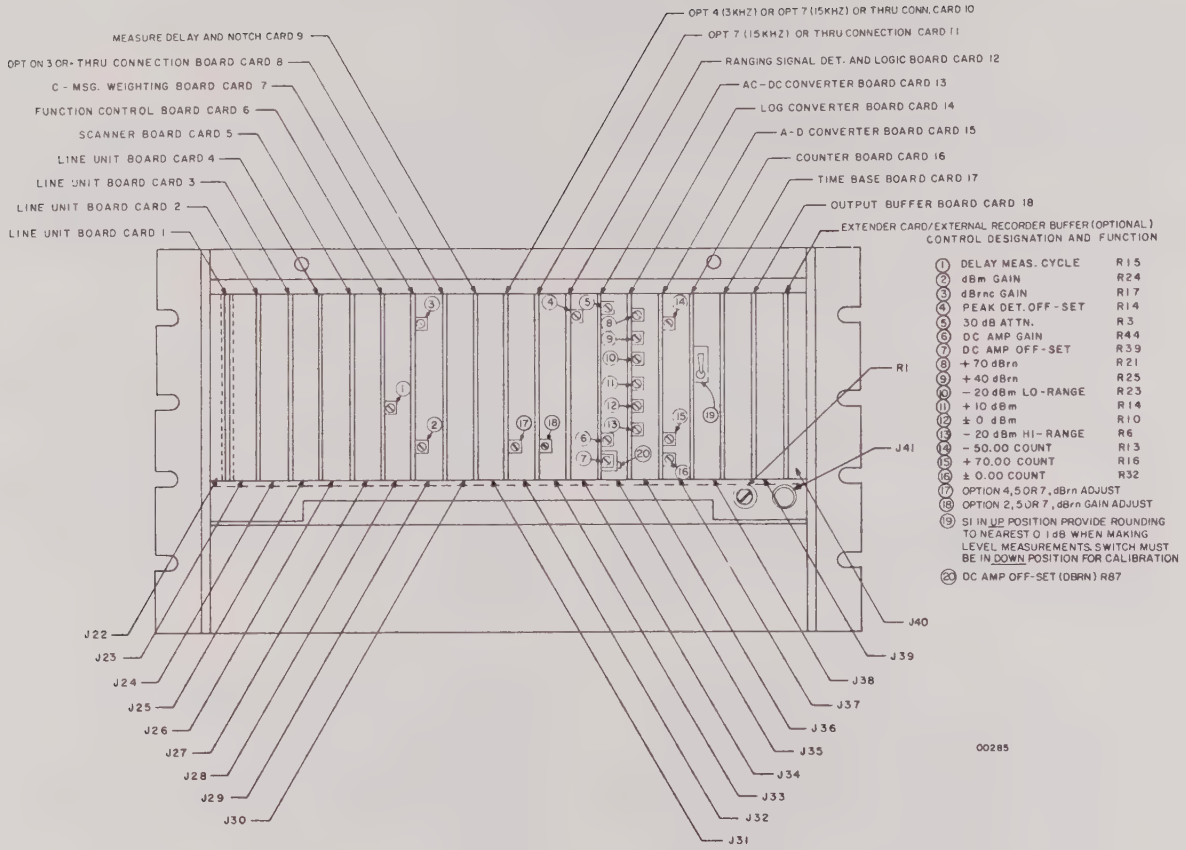

MEASURE DELAY AND NOTCH CARD 9
OPT ON 3 OR + THRU CONNECTION BOARD CARD 8
C - MSG. WEIGHTING BOARD CARD 7
FUNCTION CONTROL BOARD CARD 6
SCANNER BOARD CARD 5
LINE UNIT BOARD CARD 4
LINE UNIT BOARD CARD 3
LINE UNIT BOARD CARD 2
LINE UNIT BOARD CARD 1
OPT 4 (3KHZ) OR OPT 7 (15KHZ) OR THRU CONN. CARD 10
OPT 7 (15KHZ) OR THRU CONNECTION CARD 11
RANGING SIGNAL DET. AND LOGIC BOARD CARD 12
AC-DC CONVERTER BOARD CARD 13
LOG CONVERTER BOARD CARD 14
A-D CONVERTER BOARD CARD 15
COUNTER BOARD CARD 16
TIME BASE BOARD CARD 17
OUTPUT BUFFER BOARD CARD 18
EXTENDER CARD/EXTERNAL RECORDER BUFFER (OPTIONAL)
CONTROL DESIGNATION AND FUNCTION
① DELAY MEAS. CYCLE R15
② dBm GAIN R24
③ dBrnc GAIN R17
④ PEAK DET. OFF-SET R14
⑤ 30 dB ATTN. R3
⑥ DC AMP GAIN R44
⑦ DC AMP OFF-SET R39
⑧ +70 dBrn R21
⑨ +40 dBrn R25
⑩ -20 dBm LO-RANGE R23
⑪ +10 dBm R14
⑫ ± 0 dBm R10
⑬ -20 dBm HI-RANGE R6
⑭ -50.00 COUNT R13
⑮ +70.00 COUNT R16
⑯ ± 0.00 COUNT R32
⑰ OPTION 4,5 OR 7, dBrn ADJUST
⑱ OPTION 2,5 OR 7, dBrn GAIN ADJUST
⑲ SI IN UP POSITION PROVIDE ROUNDING TO NEAREST 0.1 dB WHEN MAKING LEVEL MEASUREMENTS. SWITCH MUST BE IN DOWN POSITION FOR CALIBRATION
⑳ DC AMP OFF-SET (DBRN) R87
R1
J41
J40
J39
J38
J37
J36
J35
J34
J33
J32
J31
J22
J23
J24
J25
J26
J27
J28
J29
J30
00285

Figure 6—1. Model 8610A Calibration Adjustments, Jacks, And Circuit Cards

6.4 PERIODIC ACCURACY CHECK AND CALIBRATION

6.5 It is recommended that calibration of the 8600 system be rechecked and touched up at intervals of about 90 days. This will insure precision measurements at all times. The following procedure suggests only the minor adjustments which should be made if found necessary. (More major adjustments should be made with the aid of procedures outlined in paragraph 6.7.) Perform the following steps.

1. Make sure the 8600 system is turned on and allow a two-hour warm up to insure stability before calibration is checked.

2. Insert a dummy (no cord connections) 310 plug into the 310 input jack of an access unit. Press the access unit's 600, TERM and LEVEL buttons. Stop system scanning by pressing the STOP button on the access unit.

3. Remove the front panel of the 8610A-CN central measurement unit and apply a 0 dBm ± 0.01 dB (600 ohms) signal at 1 kHz to jack J41. (See Figure 6—1.)

NOTE

R1 (adjacent to jack J41) is a factory calibrated reference 600-ohm loss pad and should **not** be adjusted.

4. Observe the nearest readout unit. It should read 0.0 dBm ± 0.1 dB.

5. Vary the input signal level applied to J41 by increments of 10 ± 0.01 dB over the full range from +10 dBm to −50 dBm. The system's tracking accuracy should be within ±0.1 dB from +10 dBm to −40 dBm, and within ±0.25 dB down to the −50 dBm level.

6.6 If the system accuracy is not within the tolerances listed above, consider the symptoms designated below and perform the indicated recalibration tasks.

1. If a linear tracking error (not exceeding ±0.2 dB) is present over the entire dynamic range from +10 to −50 dBm, **then** adjust the 8610A's GAIN control (item 2 on Figure 6−1) to correct the error at 0 dBm input signal level to J41. The correction should bring the entire dynamic range within specifications.

2. If linear tracking error (not exceeding ±0.2 dB) is present only on the higher range (+10 to −20 dBm) with good tracking on the lower range, **then** adjust the 8610A's 30 DB ATTEN control (item 5 on Figure 6−1) to correct the error at 0 dBm input signal level to J41.

3. If linear tracking error (not exceeding ±0.2 dB) is present only on the lower range (−20 to −50 dBm) with good tracking on the higher range, **then** adjust the 8610A's −20 DBM LO RANGE control (item 10 on Figure 6−1) to correct the error at −20 dBm input signal level to J41.

NOTE

To insure that the adjustment is being made on the correct range, obtain the −20 dBm input level by **increasing** it from −50 dBm.

4. If tracking error (not exceeding ±0.2 dB) exists at −20 dBm and −10 dBm only, **then** adjust the 8610A's −20 DBM HI RANGE control (item 13 on Figure 6−1) to correct the error at −20 dBm input signal level to J41.

NOTE

To insure that the adjustment is being made on the correct range, obtain the −20 dBm input level by **decreasing** it from +10 dBm.

5. If tracking error (not exceeding ±0.2 dB) exists only at +10 dBm, **then** adjust the 8610A's +10 DBM control (item 11 on Figure 6−1)) to correct the error at +10 dBm input signal level to J41.

NOTE

Perform steps 6 and 7 below only if readjustment of −20 DBM HI RANGE (item 13) or +10 DBM (item 11), or both, was required in the above procedures. Otherwise, skip to step 8.

6. Apply 0 dBm ± 0.01 dB at 1 kHz to J41 on the 8610A. Adjust 0 DBM control (item 12 on Figure 6−1) to obtain an alternating plus (+) and minus (−) sign condition on the readout unit.

7. Recheck the dynamic range tracking at +10 dBm −20 dBm (HI RANGE) into 8610A jack J41.

8. Apply glyptol (or equivalent) compound to those controls which have been adjusted.

9. Perform the **Initial Accuracy Check And Calibration** procedure of paragraph 6.2.

6.7 POST MAINTENANCE CALIBRATION

6.8 The following calibration procedures should be used only in the event that:

☐ an accuracy error greater than ±0.2 dB is noted in the Periodic Accuracy Check of paragraph 6.4, or

☐ a critical component is replaced in the 8610A central measurement unit.

NOTE

In the later case, only the circuit card associated with the replaced component needs to be checked and recalibrated.

6.9 The following procedure should be used to recalibrate and/or check individual system functions. Perform the procedure in the order presented below.

6.10 CALIBRATION OF A/D CONVERTER (CARD 15)

CAUTION

A potential of +190 Vdc appears on the card connector J36. Use insulated clips or other suitable connectors to avoid accidental shorting to adjacent pins when making test connections.

NOTE

Do not attempt calibration of the A/D converter without proper test equipment.

6.11 **Preparation For A/D Converter Card Calibration**

6.12 The 8600 system readout unit which is to be observed during calibration of the A/D converter card must be temporarily modified in order to increase resolution of the data display to the hundredth place. To accomplish this modification, perform the following steps.

1. Disconnect cable from the readout unit and remove the readout's cover.

2. Locate diode CR2 and unsolder the cathode side.

3. Replace cover on the readout and reconnect the cable.

6.13 A/D Converter Card 15 Check And Calibration Steps

6.14 To check and calibrate the A/D converter, perform the following steps.

1. Switch off power to the 8610A unit.

2. Connect high side of digital voltmeter (or equivalent dc volts measuring unit having ±0.1% accuracy and with ranges covering 0 to ±7 Vdc) to J36-H. Connect the DVM low side to J36-1.

3. Insert dummy 310 plug into an access unit, then press the LEVEL and 600 buttons on that access unit.

4. Switch system power on and place in scan mode by pressing SCAN button on access unit. Then press STOP button to stop the system at this access unit.

5. Apply a 1-kHz signal to J41 (see Figure 6–1) on the 8610A. Carefully adjust the signal level for 0 Vdc ± 1 mV on the DVM.

NOTE

0 Vdc at this point corresponds to 0 dBm input level at J41.

NOTE

The signal source must be capable of variable output levels from +10 dBm to −60 dBm into 600 ohms with adjustable resolution to within ±0.01 dB.

6. Adjust A/D OFFSET control (item 16 on Figure 6–1) to obtain alternating plus (+) and minus (−) signs on the readout unit together with all zeros.

7. Set oscillator level to approximately −50 dBm, then carefully adjust the oscillator level to obtain a −5.000 Vdc reading on the DVM.

8. Adjust −50.00 COUNT control (item 14 on Figure 6–1) for a display of −50.00 ± 1 count on the readout unit.

9. Press NOISE button on the access unit. Set the oscillator to about −20 dBm, then carefully adjust the oscillator to obtain a reading of +7.000 Vdc on the DVM.

10. Adjust +70.00 COUNT control (item 15 on Figure 6–1) for a display of +70.00 ± 1 count on the readout unit.

11. Repeat steps 3 through 6 to return to LEVEL measurement at 0 dBm.

12. Alternately set the input signal level for +0.010 (+10 mV) and −0.010 (−10 mV) on the DVM. Adjust ±0.000 COUNT control (item 16 on Figure 6–1) to obtain equal readings on the readout. (Make readings equal within ±0.10 dB.)

13. Recheck calibration at −5.000 Vdc and at +7.000 Vdc by repeating steps 7 through 10.

14. Apply glyptol or equivalent locking compound to the controls.

6.15 CALIBRATION OF LOG CONVERTER (CARD 14)

CAUTION

Use insulated test clips to avoid shorting between pins on J34.

NOTE

The A/D converter card 15 **must** have been checked for proper calibration before the log converter card is calibrated.

6.16 To check and calibrate the log converter card, perform the following steps.

1. Make sure a readout unit modification has been made per paragraph 6.12.

2. Allow a two-hour warm up to assure system stability before attempting calibration.

3. Insert a dummy 310 plug into an access unit, then press the LEVEL and 600 buttons on that access unit.

4. Make sure system power is on, than place in scan mode by pressing SCAN button on access unit. Then press STOP button to stop the system at this access unit.

5. Apply a 1-kHz signal (any level) to J41 (see Figure 6–1) on the 8610A.

6. Connect the high side of digital voltmeter (or equivalent dc volts measuring unit having ±0.1% accuracy with ranges covering 0 to ±7 Vdc) to J34-N. Connect the DVM low side to J34-1.

7. Adjust oscillator level (approximately −20 dBm) for a 0.1900 Vdc reading on the DVM.

NOTE

To assure adjustment will be made on correct range, start with input of +10 dBm and **decrease** the input to the desired −20 dBm.

8. Adjust −20 DBM HI RANGE control (item 13 on Figure 6−1) for a display of −20.00 ± 0.01 on the readout unit.

9. Increase the input signal level (to about +10 dBm) to obtain a reading of exactly 6.000 Vdc on the DVM. Adjust +10 DBM control (item 11 on Figure 6−1) for a display of +10.00 ± 0.01 on the readout unit.

10. Decrease the input signal level (to approximately 0 dBm) to obtain a reading of exactly 1.900 Vdc on the DVM. Adjust 0 DBM control (item 12 of Figure 6−1) to obtain alternating plus (+) and minus (−) signs on the readout coincident with a display of all zeros (±0.000).

11. Repeat steps 7 through 10 as necessary for desired ±0.01 dB tracking of log converter at input levels of −20 dBm, +10 dBm, and 0 dBm.

12. Apply glyptol or equivalent locking compound to the controls.

NOTE

Calibration of the −20 DBM LO RANGE control, the +70 DBRN and the +40 DBRN controls is covered in paragraph 6.24.

6.17 CALIBRATION OF AC/DC CONVERTER (CARD 13)

CAUTION

Use insulated test clips to avoid shorting between pins on J34.

NOTE

The A/D converter card 15 and the log converter card 14 **must** have been checked for proper calibration before the AC/DC converter card is calibrated.

6.18 **Preparation For AC/DC Converter Calibration**

6.19 Perform the following steps.

1. Make sure a readout unit modification has been made per paragraph 6.12.

2. Shut system power off. Place AC/DC converter card 13 on an extender board. Switch system power back on.

3. Allow a 5-minute warm up.

4. Insert a dummy 310 plug into an access unit, then press the TERM, 600, and LEVEL buttons on that access unit.

5. Place system into scan mode by pressing SCAN button on access unit. Then press STOP button to stop the system at this access unit.

6. Apply a 1-kHz signal (any level) to J41 (see Figure 6−1) on the 8610A.

NOTE

The signal source must be capable of variable output from +10 to −30 dBm into 600 ohms, and level setting resolution of −0.05 dB.

7. Proceed to paragraph 6.20.

6.20 **Calibrating 30 dB Attenuator on Card 13**

6.21 Perform the following steps.

1. Connect the high side of a VTVM to J34-P. Connect the VTVM low side to J34-T.

2. Set the input signal level into J41 for a reading of exactly +10 dBm ± 0.01 dB.

3. Move the VTVM high side to the junction of resistors R1, R2, R4 on the AC/DC converter card 13.

NOTE

Connection to the resistors is best made by:

(a) Shuting power off.
(b) Pulling card 13 and clip lead to resistor junction.
(c) Pluging card 13 back in.
(d) Connecting VTVM to the loose end of the clip lead.
(e) Turning power back on.

4. Adjust 30 DB ATTEN control (item 5 on Figure 6—1) for a reading of −20.0 dBm ± 0.01 dB on the VTVM.

5. Remove VTVM and other test connections. Return card to slot 13.

6. Proceed to paragraph 6.22.

6.22 **Calibrating DC Amplifier On Card 13**

6.23 Perform the following steps.

1. Allow a two-hour warm up to insure system stability before performing the rest of this procedure.

2. Connect the high side of a VTVM to J34-P. Connect the low side to J34-T.

3. Make sure a 1-kHz input signal at about +10 dBm is being applied to J41 (see Figure 6—1) on the 8610A.

4. Set the input signal level for a reading of exactly +9.5 dBm ± 0.01 dB on the VTVM. Adjust DC AMP GAIN control (item 6 on Figure 6—1) for a display of +10.00 dBm ± 0.01 dB on the modified readout unit.

5. Reduce the input level at J41 to obtain a reading of −20.5 dBm ± 0.01 dB on the VTVM. Adjust DC AMP OFFSET control (item 7 on Figure 6—1) for a display of −20.00 dBm ± 0.01 dB on the modified readout unit.

NOTE

Reduce the input level from +10 dBm to −20.5 dBm to insure autoranging will select the correct range.

6. Repeat step 4. If readjustment of the control was necessary, then repeat step 5 also.

NOTE

The measured ac levels at J34-P above correspond to detected dc levels at follows:

☐ +10 dBm at J34-P = +6.000 Vdc at J34-N.

☐ −20.5 dBm at J34-P = +0.190 Vdc at J34-N.

7. Apply glyptol or similar locking compound to the controls.

8. Proceed to finish log converter card 14 calibration as described in paragraph 6.24.

6.24 **Finishing Log Converter Calibration After AC/DC Converter Calibration**

6.25 Perform the following steps.

1. Make sure VTVM is still connected to J34-P and input signal is applied to 8610A J41 as in paragraph 6.23 above.

2. Set input level to obtain a reading of exactly −20.5 dBm ± 0.01 dB on the VTVM.

NOTE

To be sure correct range is selected, start input level at −30 dBm and **increase** to obtain the −20.5 dBm reading.

3. Adjust −20 DBM LO RANGE control (item 10 on Figure 6—1) for a display of −20.00 dBm ± 0.01 dB on the modified readout unit.

4. Press NOISE button on the active access unit.

5. Increase input level at J41 for a reading of exactly +9.5 dBm ± 0.05 dB on the VTVM. Adjust +70 DBRN control (item 8 on Figure 6—1) to obtain a display of +70.00 dBrn ± 0.05 dB on the modified readout unit.

6. Decrease input lead at J41 to about −60 dBm. Then increase the signal level again to obtain a reading of −20.50 dBm ± 0.05 dB on the VTVM. Adjust +40.00 DBRN control (item 9 on Figure 6—1) to obtain a display of +40.00 dBrn ± 0.05 dB on the modified readout unit.

7. Apply glyptol or similar locking compund to the controls.

6.26 CALIBRATION OF C-MSG FILTER (CARD 7)

CAUTION

Use insulated test clips to avoid shorting pins on J28.

NOTE

A/D converter card 13, log converter card 14, and AC/DC converter card 13 **must** have all been checked for calibration before the C-message filter card is calibrated.

6.27 **Preparation For C-Message Card Calibration**

6.28 Perform the following steps.

1. Allow a 15-minute warm up period.

2. Insert a dummy 310 plug into an access unit. Press the TERM, 600, and LEVEL buttons on the access unit. Press SCAN button then press STOP button on the access unit.

3. Apply a 1-kHz signal (any level) to J41 on the 8610A.

NOTE

The signal source must be capable of variable output from +10 to −30 dBm into 600 ohms, and level setting resolution of ±0.01 dB.

4. Proceed to paragraph 6.29.

6.29 **Calibrating DBM GAIN Adjust On Card 7**

6.30 Perform the following steps.

1. Connect the high side of a VTVM to J28-3. Connect the VTVM low side to J28-C.

2. Set input level at J41 for a reading of −0.6 dBm ± 0.01 dB on the VTVM.

3. Adjust DBM GAIN control (item 2 on Figure 6−1) to obtain alternating plus (+) and minus (−) signs on the system readout unit, coincident with all zeros.

4. Proceed to paragraph 6.31.

6.31 **Calibrating DBRNC GAIN Adjust On Card 7 (Also Options 4 And 7)**

6.32 Perform the following steps.

1. Press NOISE button on the access unit.

2. With the VTVM at J28-3 as in paragraph 6.28 above, set the input level at J41 for a reading of −20.6 dBm ± 0.05 dB on the VTVM.

3. Adjust DBRNC GAIN control (item 3 on Figure 6−1) for a display of +70.00 dBrn ± 0.1 dB on the modified readout unit.

NOTE

If option 4 (3-kHz noise filter) or Option 7 (15-kHz noise filter) are installed in the 8610A, use steps 1 through 3 above for calibration. The controls are items 17 and 18 in Figure 6−1.

4. Apply glyptol or similar locking compound to controls.

5. Recheck system tracking accuracy as outlined in paragraph 6.4.

6. Recalibrate each access unit as outlined in paragraph 6.2.

6.33 CALIBRATION OF RANGING DETECTOR (CARD 12)

NOTE

This card has only one adjustment, PEAK DETECTOR OFFSET (item 4 on Figure 6−1). This adjustment is non-critical and should never need recalibration unless U1 on AC/DC converter card 13 or U5 on ranging detector card 12 have been replaced.

6.34 If adjustment is ever required, perform the following steps.

1. Turn off system power and place ranging detector card 12 on an extender board.

2. Temporarily solder one end of a 4700-ohm ½W resistor to the base of Q11. Solder the other end of the resistor to +5V.

3. Connect high side of a VOM to junction of R16 and R17, emitter of Q4. Connect low side of VOM to printed circuit ground.

4. Turn system power back on.

5. Insert a dummy 310 plug into an access unit. Press TERM, 600, and LEVEL buttons on the access unit. Press the SCAN button then press the STOP button on the access unit.

6. Apply a 1-kHz signal to J41 on the 8610A. First set the signal level at −10 dBm, then **slowly decrease** the signal level toward −20 dBm while observing the dc voltage reading on the VOM. Note that the VOM reading decreases as the input level decreases at J41. The objective is to adjust PEAK DET OFFSET control (item 4 on Figure 6−1) such that a −20 dBm input level corresponds to about 100 mVdc at which point autoranging will occur and be indicated by a sudden jump to about 3 Vdc.

7. Adjust the PEAK DET OFFSET control (item 4 in Figure 6−1) such that 100 mV is **not** reached prematurely as the input level is reduced at J41. If autoranging does occur prematurely, repeat the sequence of steps, starting again at −20 dBm into J41.

8. Apply glyptol or similar locking compound to the control. Switch power off. Remove the 4700-ohm resistor. Replace card 12 in the card cage.

6.35 CALIBRATING FREQUENCY SQUAREWAVE FUNCTION ON AC/DC CONVERTER CARD 13

NOTE

AC/DC converter card 13 has an adjustment (R72) on its sinewave to squarewave conversion function. This adjustment should never require recalibration unless Q12, U3, or associated components are replaced.

6.36 If the adjustment is ever required, perform the following steps.

1. Turn power off and place AC/DC converter card 13 on an extender board.

2. Connect an oscilloscope probe to the junction of R64 and R65. Connect scope ground to pc board ground.

3. Turn power back on.

4. Insert a dummy 310 plug into an access unit. Press TERM, 600, and LEVEL buttons on the access unit. Press SCAN button then press STOP button on the access unit.

5. Apply a 1-kHz signal to J41 on the 8610A unit. Set the signal level to −50 dBm ± 0.5 dB.

6. Adjust R72 on card 13 to obtain a waveform on the scope like that shown in Figure 6−2.

7. Apply glyptol or similar locking compound to the control.

8. Turn off power. Remove card 13 from extender and return card 13 to the 8610A's card cage.

NOTE

Capacitor C3 on card 13 does **not** require adjustment. It is not actively used by the system.

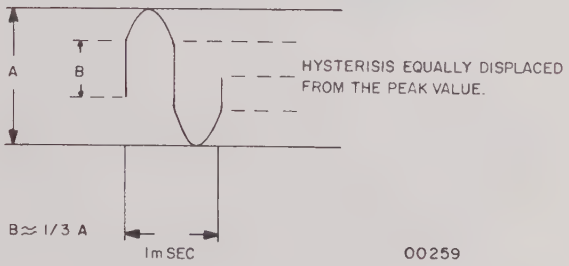


Figure 6−2. Frequency Squarewave Signal On AC/DC Converter Card 13

SECTION 7

DIAGRAMS

7.1 This section contains schematic diagrams, assembly diagrams, and wire lists for components of the 8600 system.

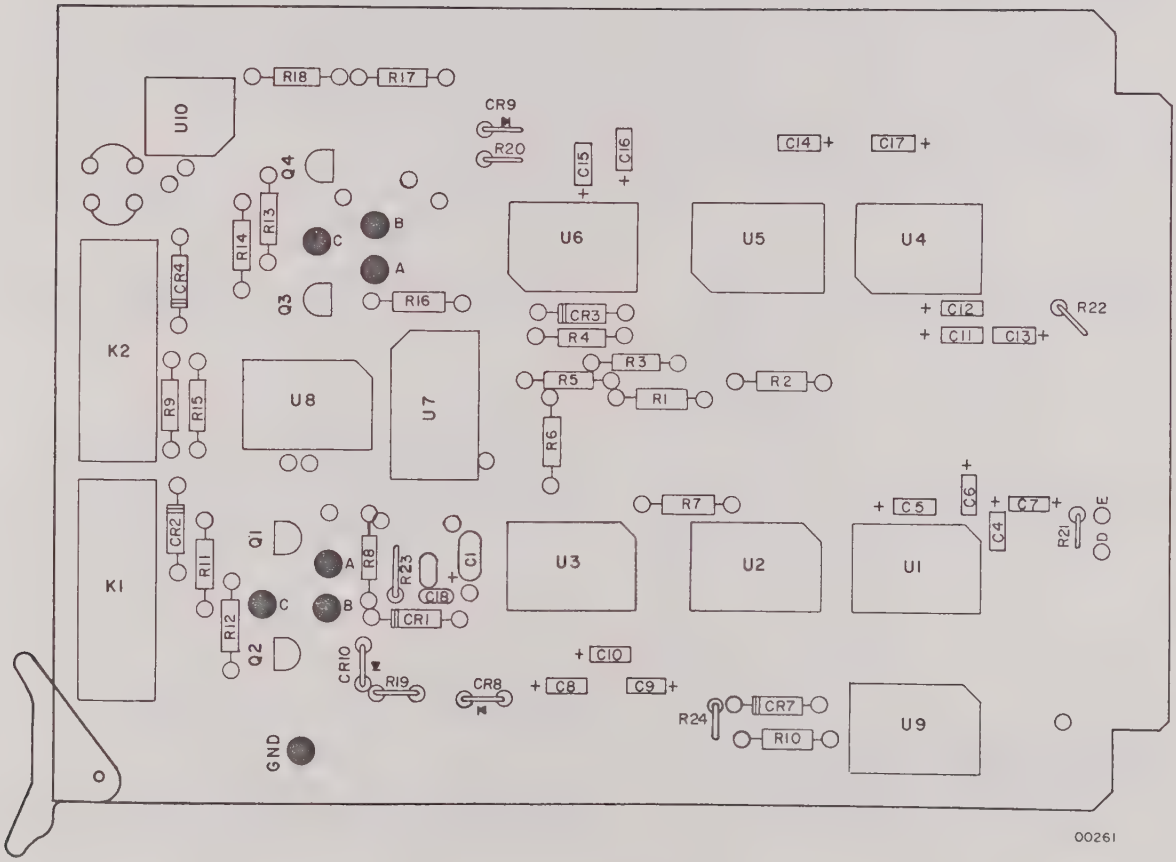


Figure 7—1. Dual Line Assembly, Type 1 (Cards 1, 2, 3) Component Location Diagram

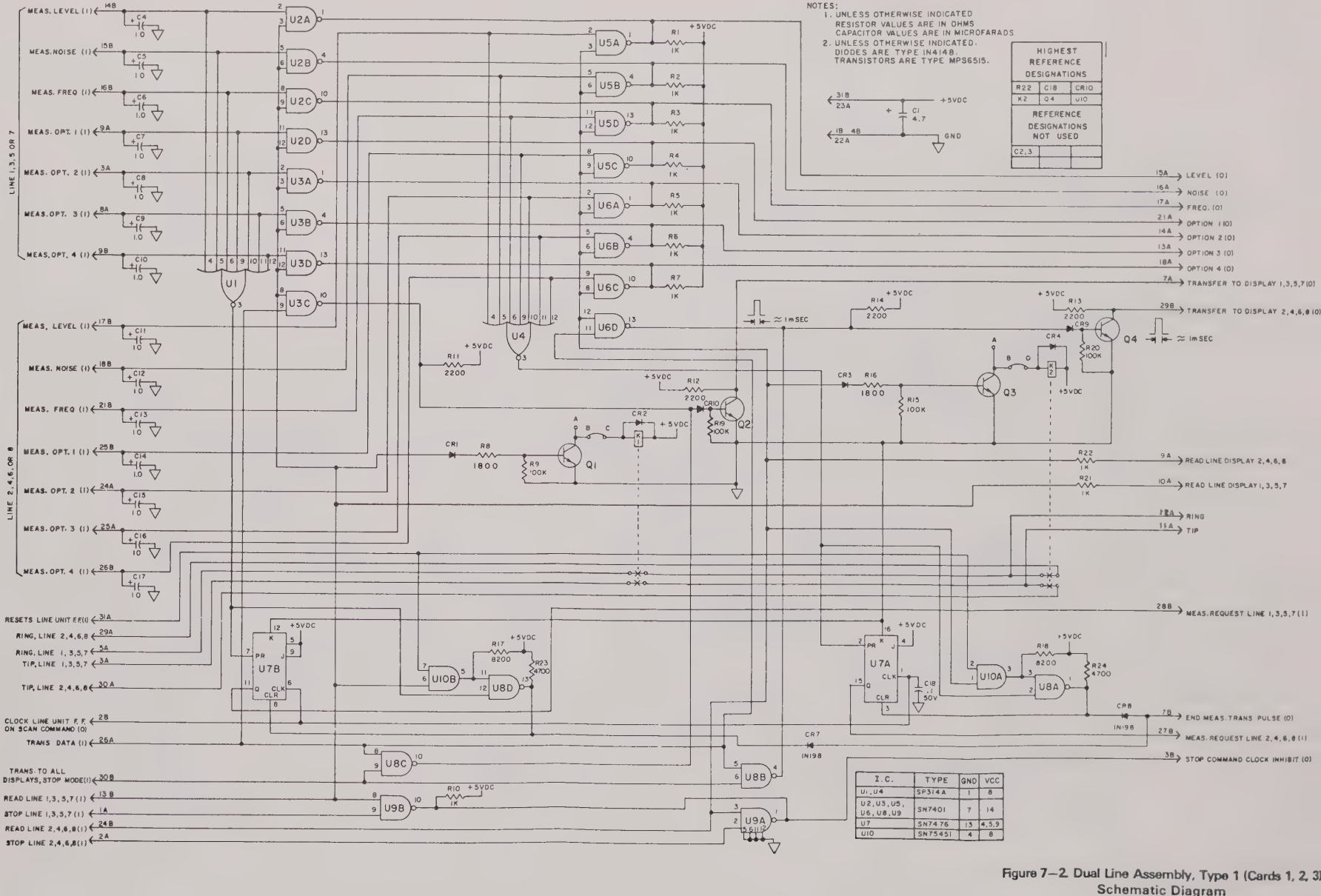


Figure 7–2. Dual Line Assembly, Type 1 (Cards 1, 2, 3) Schematic Diagram

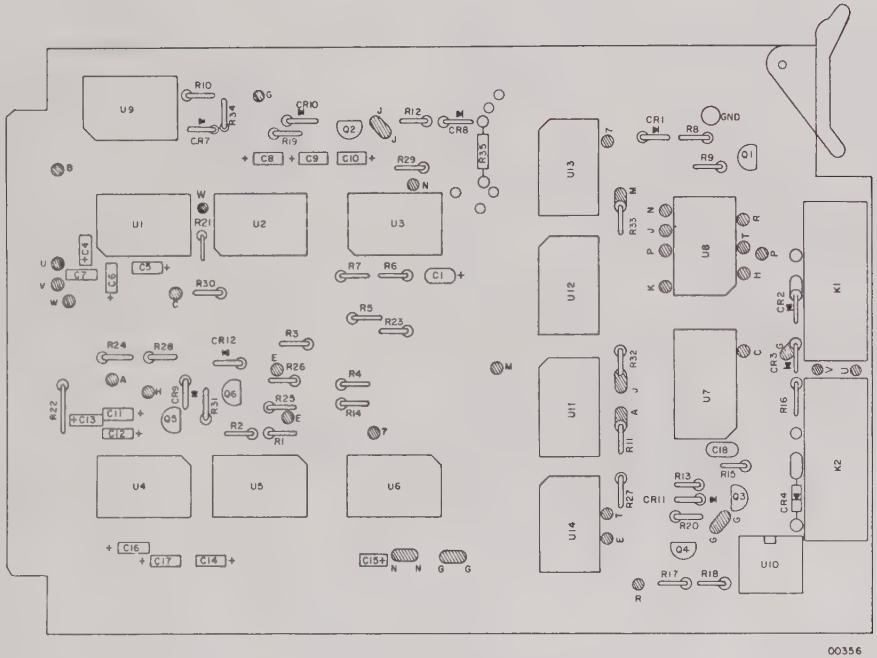
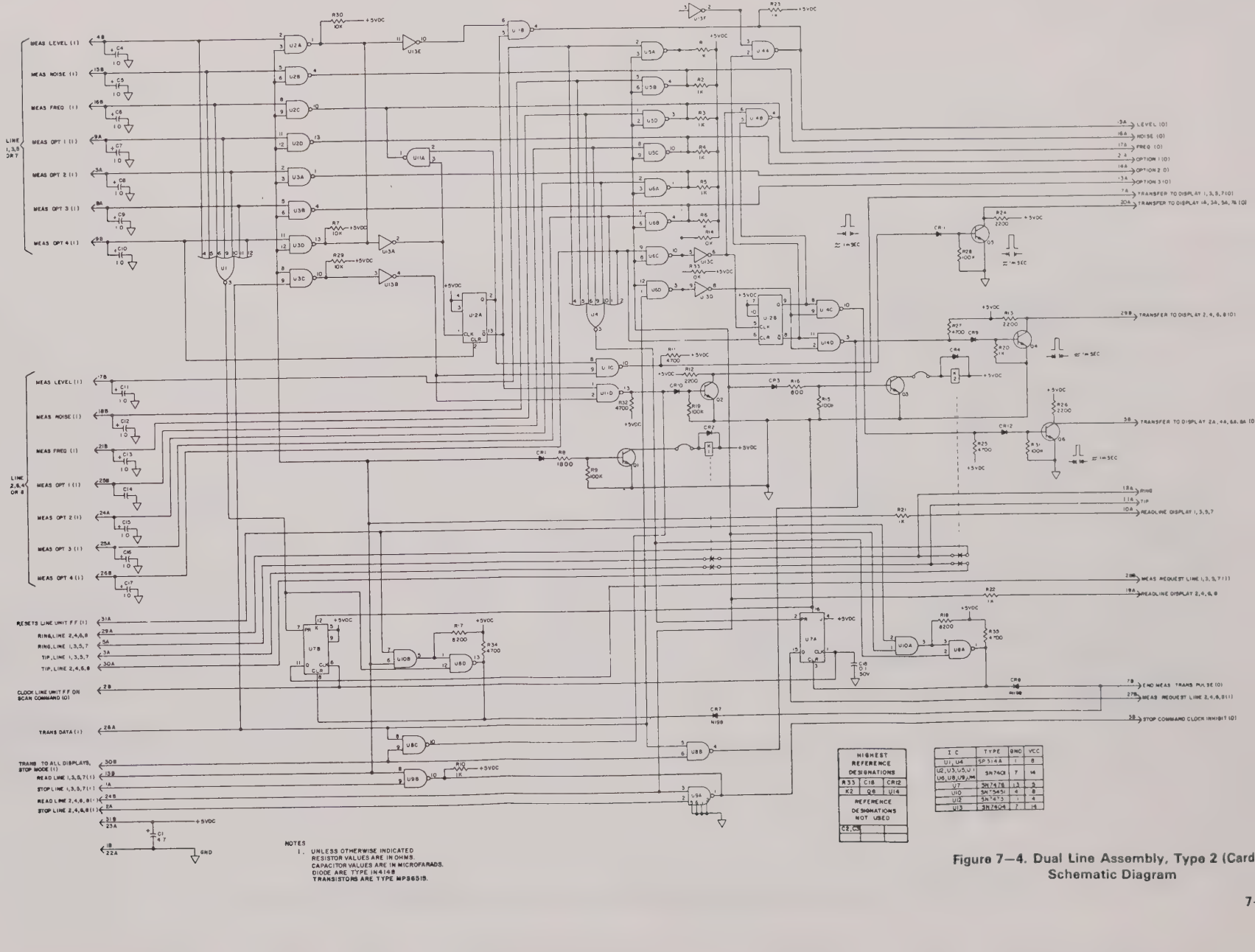


Figure 7—3. Dual Line Assembly, Type 2 (Card 4)
Component Location Diagram



HIGHEST REFERENCE DESIGNATIONS		
R33	C18	CR12
K2	Q8	U14
REFERENCE DESIGNATIONS NOT USED		
C2, C5		

I C	TYPE	GND	VCC
U1, U4	SP 5148	1	8
U2, U3, U5, U11 U6, U8, U9, U12	SN74C1	7	14
U7	SN7478	13	5
U10	SN7451	4	8
U13	SN7413	1	4
U13	SN7404	7	14

NOTES
1. UNLESS OTHERWISE INDICATED
RESISTOR VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MICROFARADS.
DIODE ARE TYPE IN4148
TRANSISTORS ARE TYPE MPS6515.

Figure 7—4. Dual Line Assembly, Type 2 (Card) Schematic Diagram

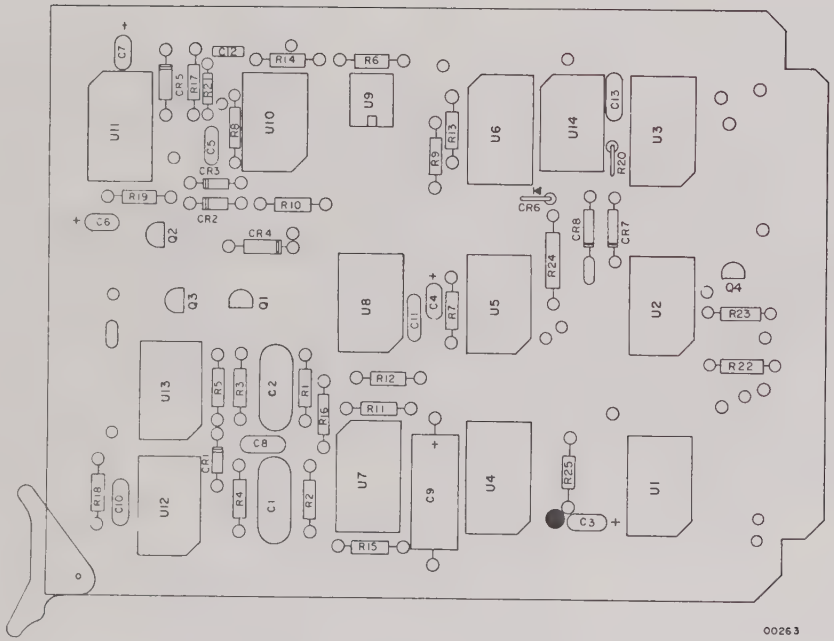
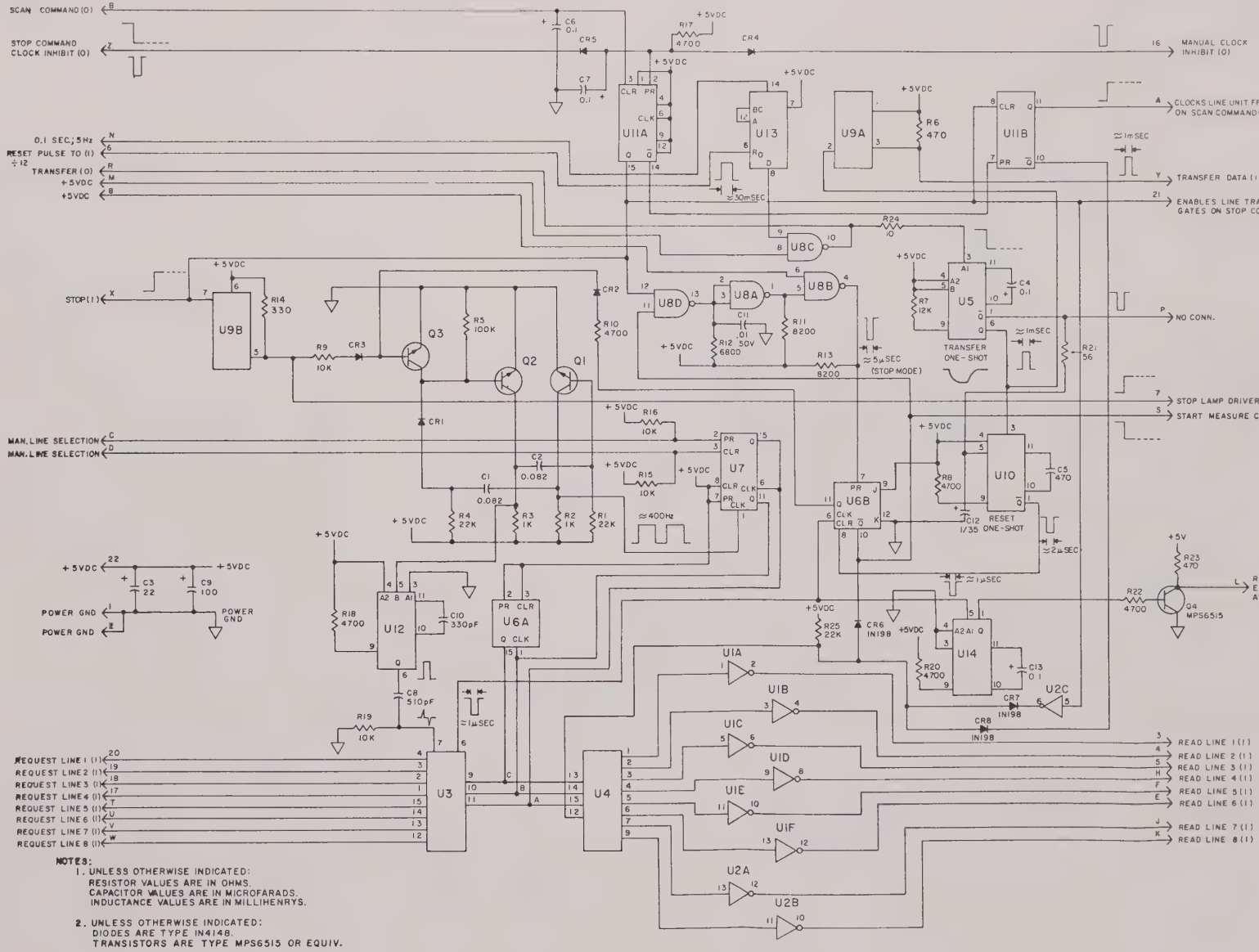


Figure 7—5. Scanner (Card 5) Component Location Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.

2. UNLESS OTHERWISE INDICATED:
   DIODES ARE TYPE IN4148.
   TRANSISTORS ARE TYPE MPS6515 OR EQUIV.

HIGHEST REFERENCE DESIGNATIONS		
C13	R24	CR8
Q4	U4	

REFERENCE DESIGNATIONS NOT USED

I C	TYPE	GND	VCC
U9	SN75451	14	8
U8	SN7401	7	14
U1 - U2	SN7404	7	14
U4	SN7442	8	16
U3	SN74151	8	16
U5, U10, U12, U14	SN74121	7	14
U6, U7, U11	SN7476	13	5
U13	SN7492	10	5

Figure 7—6. Scanner (Card 5) Schematic Diagram

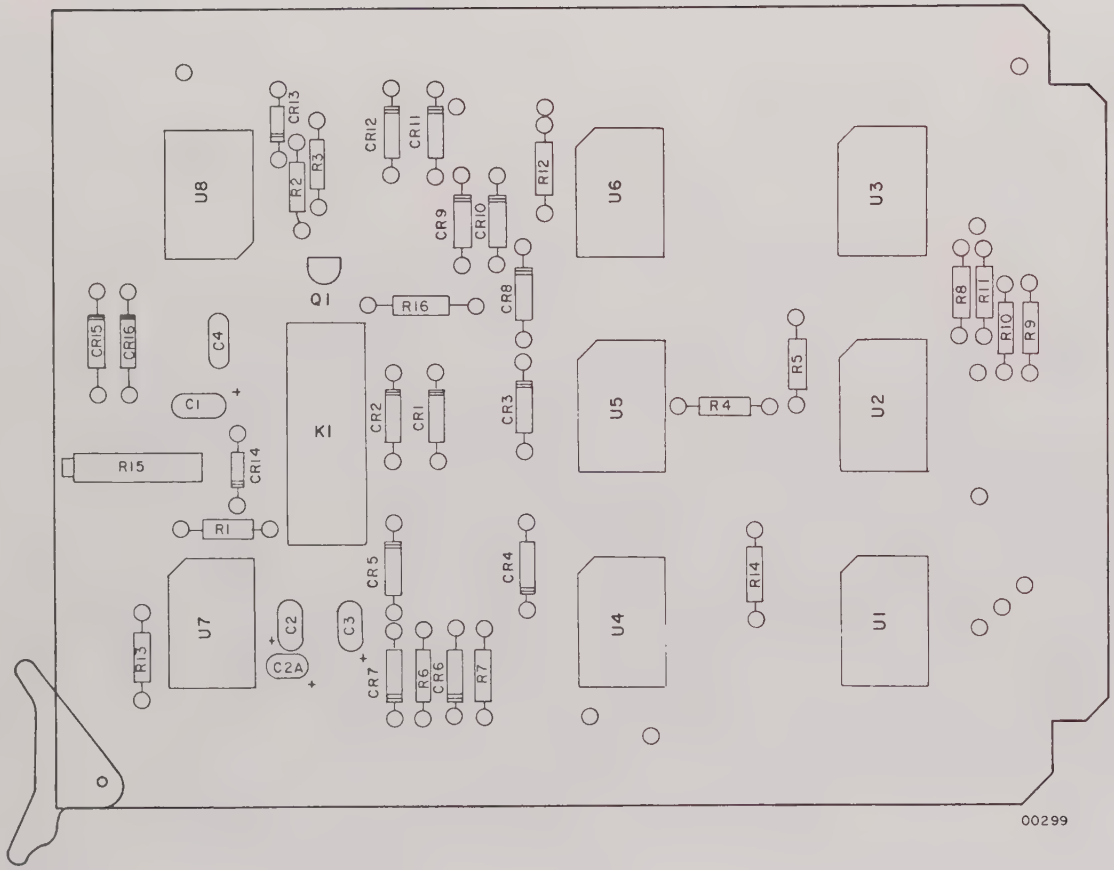


Figure 7—7. Function Control (Card 6)
Component Location Diagram

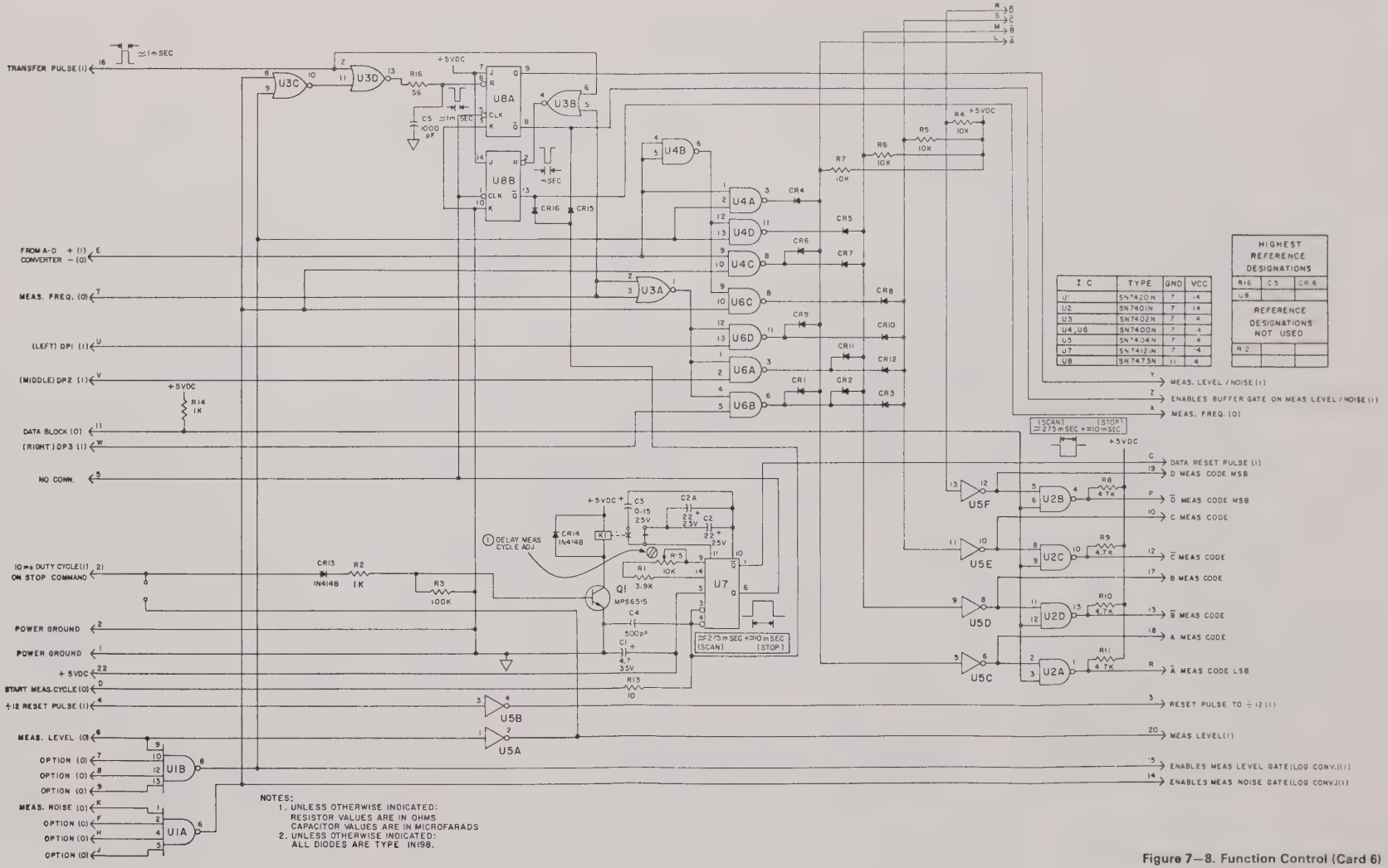


Figure 7—8. Function Control (Card 6) Schematic Diagram

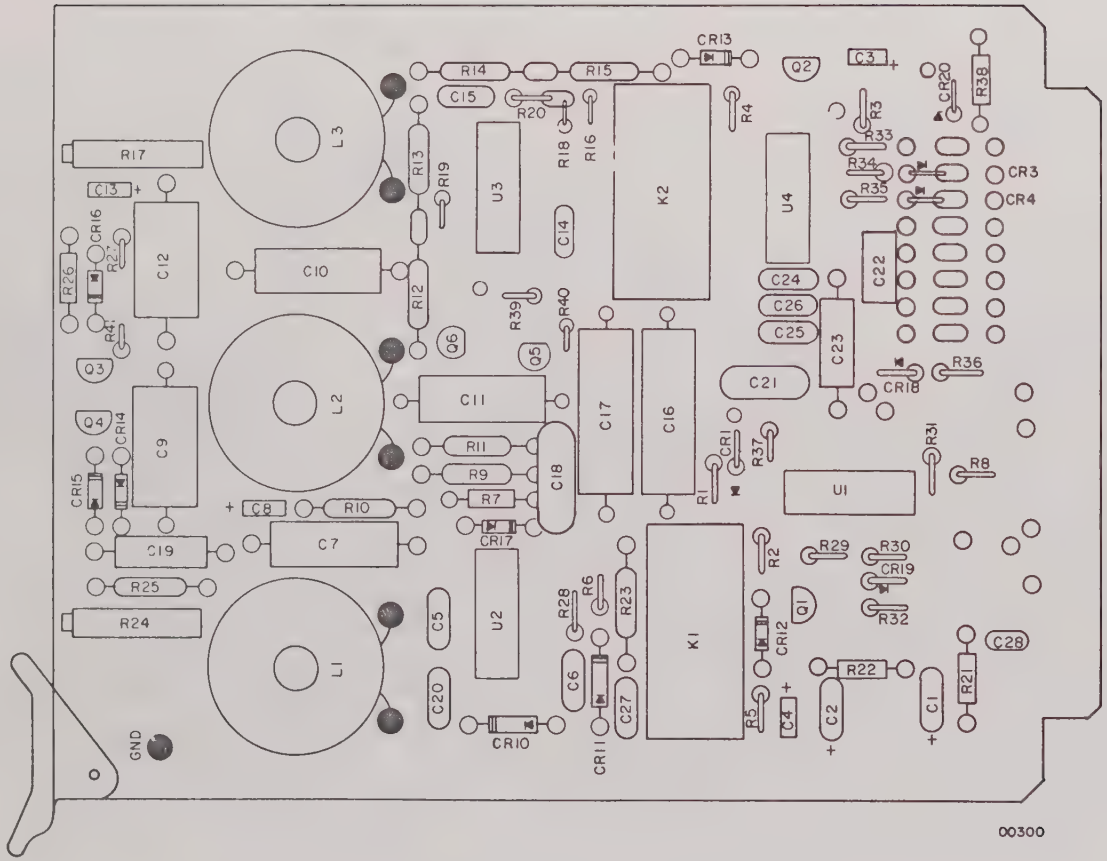
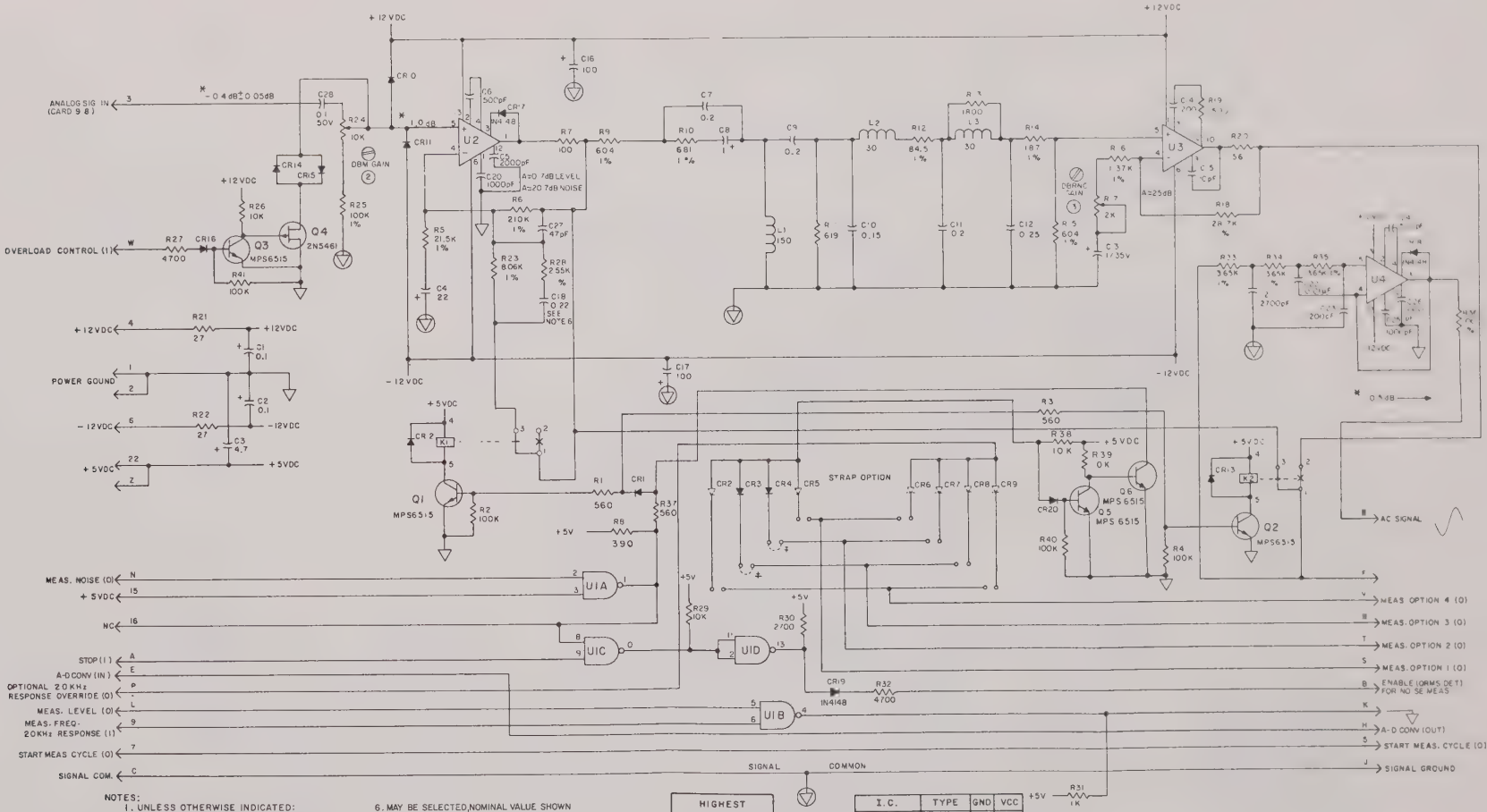


Figure 7—9. Input Amplifier And C-Message Filter (Card 7) Component Location Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. UNLESS OTHERWISE INDICATED:
   CR1 THRU CR9, CR12 THRU CR20 ARE TYPE IN4148
   CR10, CR11 ARE TYPE IN4003.
3. ▽ = SIGNAL COMMON
   ⏚ = POWER GROUND
4. * INPUT LEVEL = 0dBm
5. ✱ STRAPS USED WHEN MEAS OPTION 2 AND/OR 3 ARE UTILIZED.
   SEE INSTALLATION MANUAL, ISSUE 4, ie: 3KHz AND/OR 15KHz NOISE OPTIONS.
6. MAY BE SELECTED, NOMINAL VALUE SHOWN

HIGHEST REFERENCE DESIGNATIONS		
R41	C28	CR20
U4	Q6	L3
REFERENCE DESIGNATIONS NOT USED		

I.C.	TYPE	GND	VCC
U	SN7401N	7	14
U3	SN72709	+12V PIN 11 -12V PIN 6	
U2 AND U4	U6A7715393	+12V PIN 13 -12V PIN 10	

Figure 7—10. Input Amplifier And C-Message Filter (Card 7) Schematic Diagram

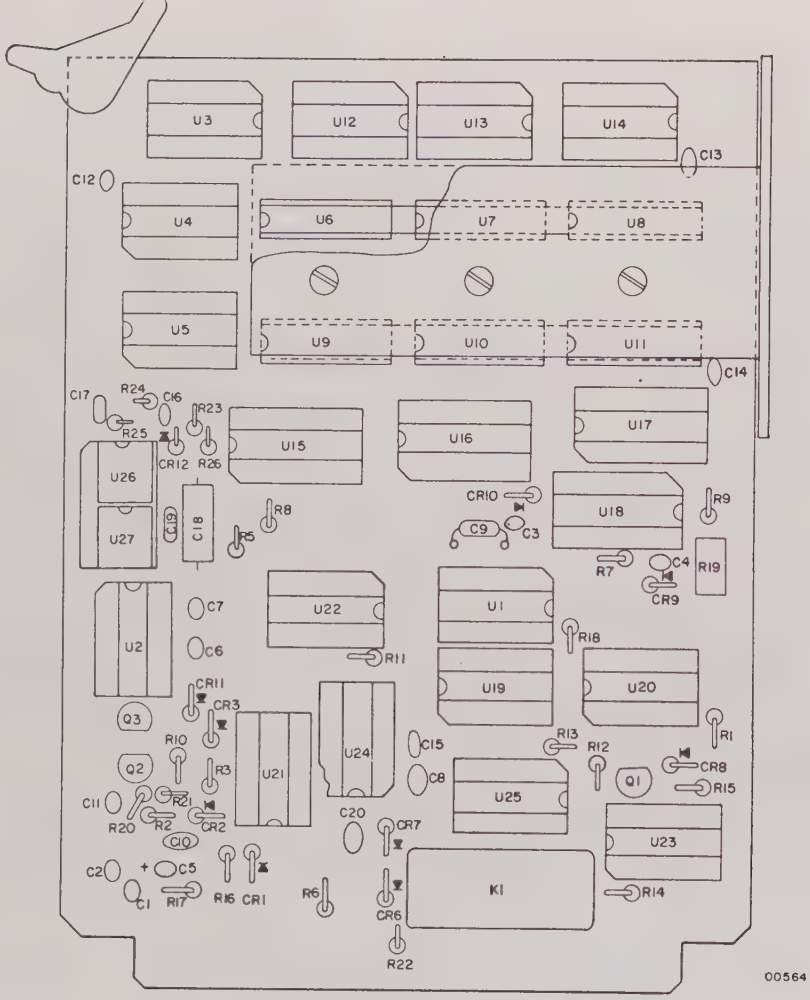


Figure 7—11. Option 3, Percent Break Converter (Card 8) Component Location Diagram

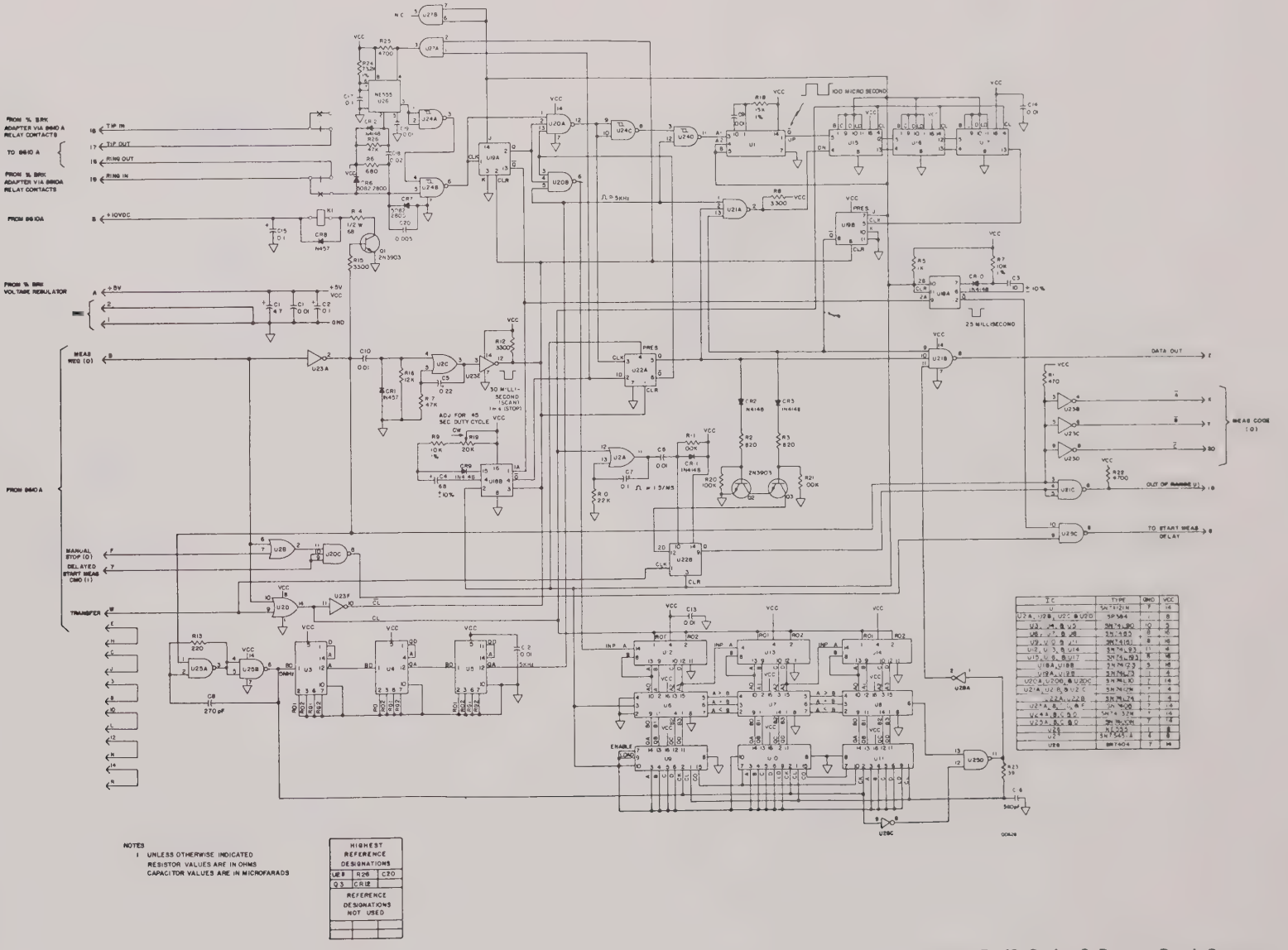


Figure 7—12. Option 3, Percent Break Converter (Card 12) Schematic Diagram

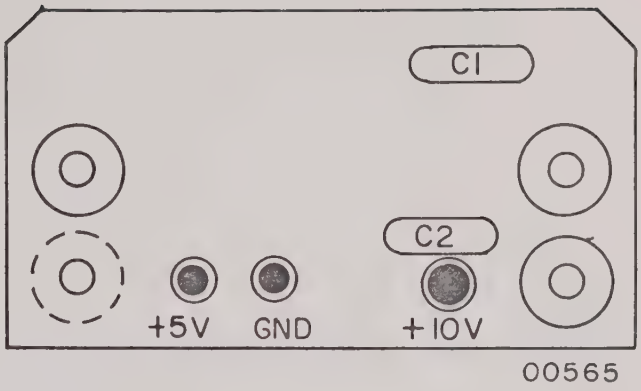


Figure 7—13. Percent Break Regulator Component Location Diagram

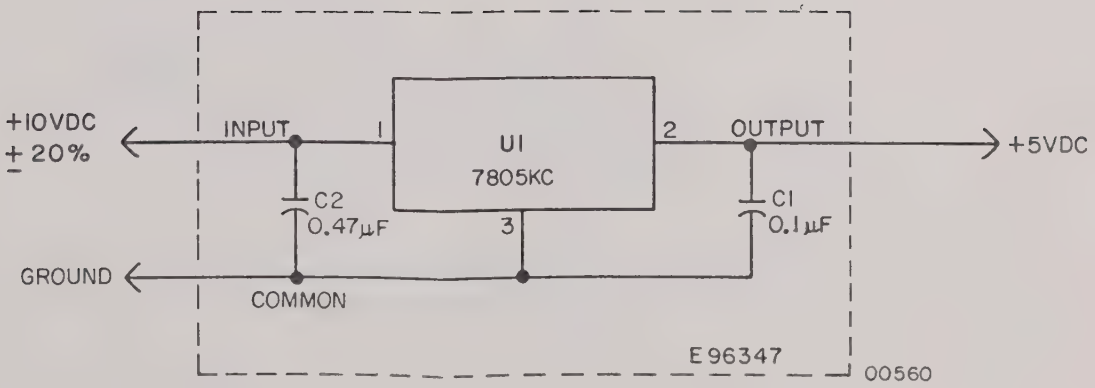


Figure 7—14. Percent Break Regulator Schematic Diagram

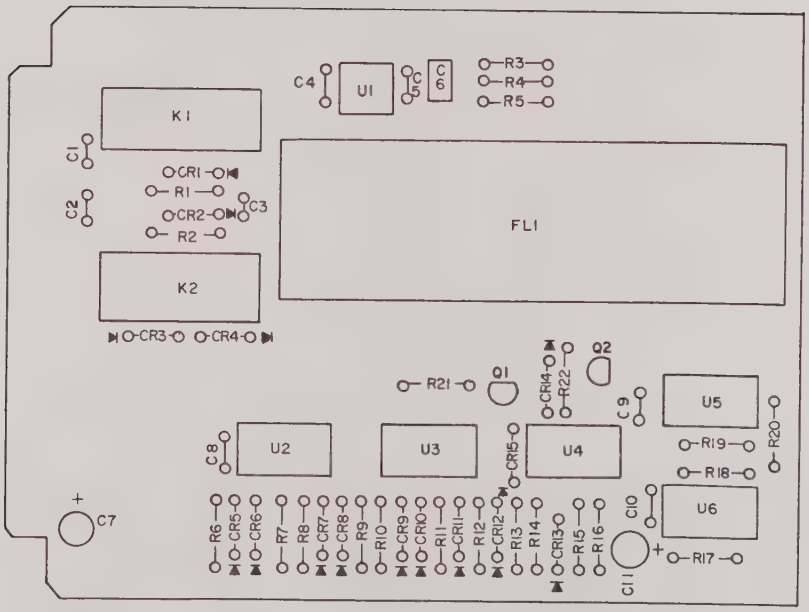
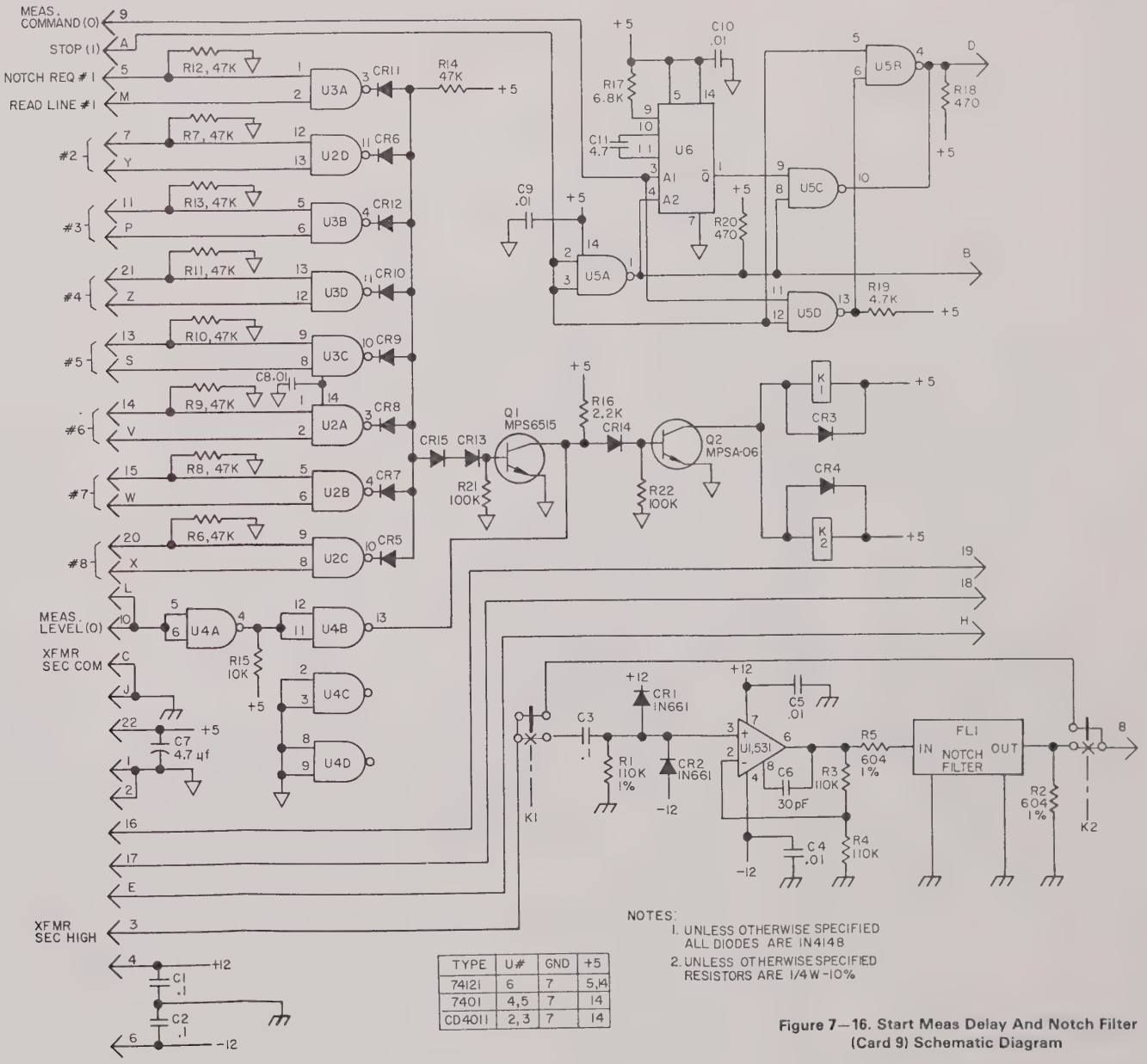


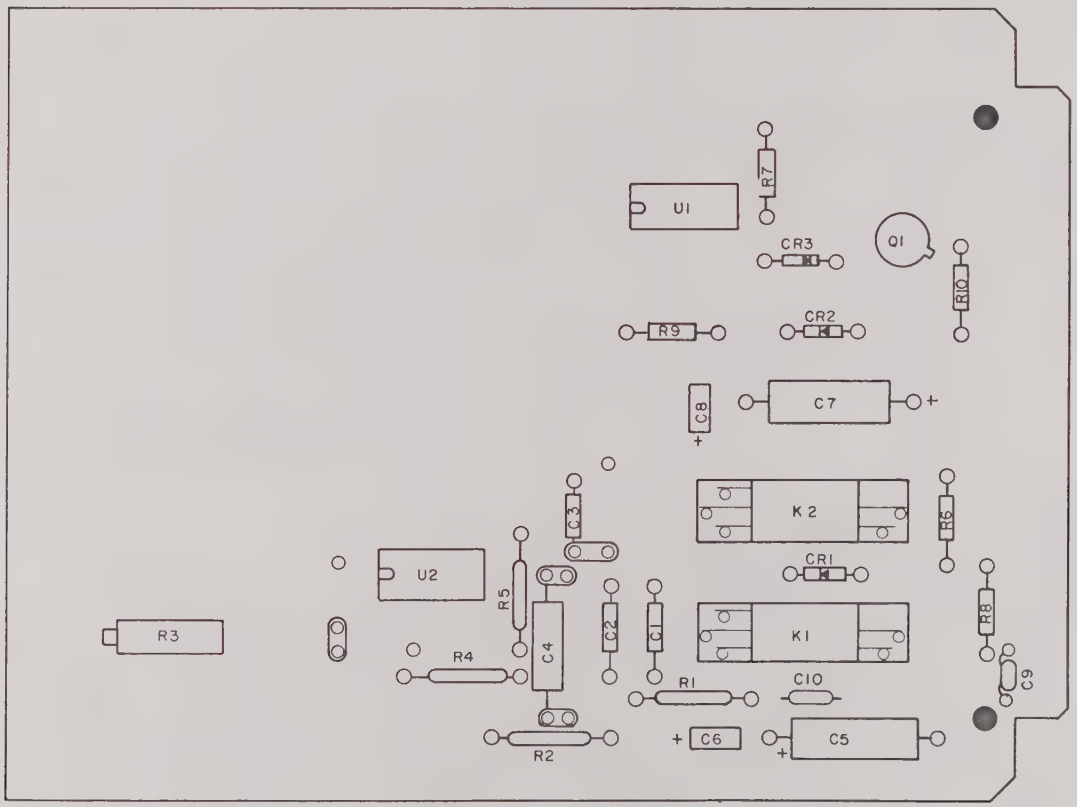
Figure 7—15. Start Meas Delay And Notch Filter (Card 9) Component Location Diagram



TYPE	U#	GND	+5
74121	6	7	5,14
7401	4,5	7	14
CD4011	2,3	7	14

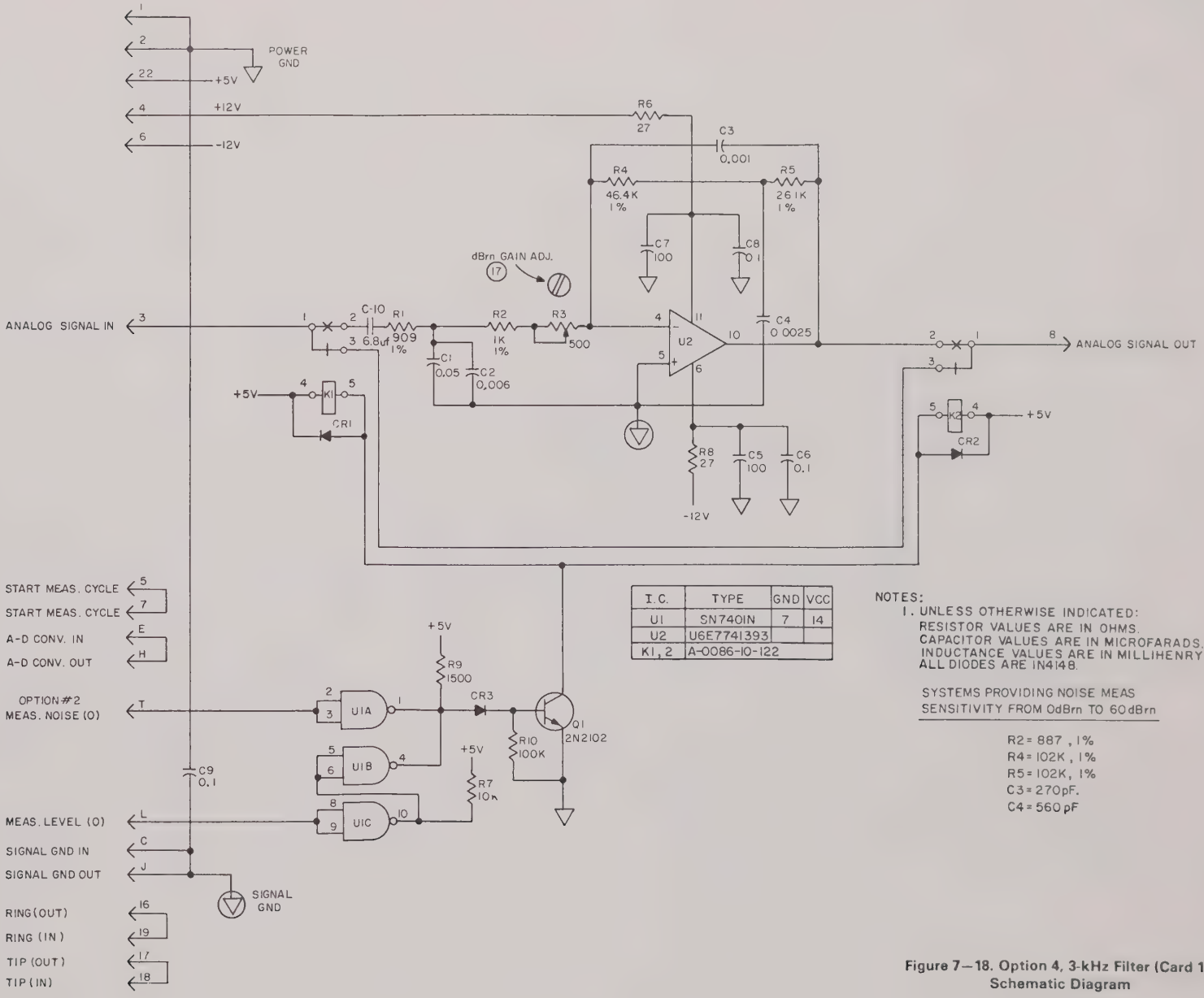
NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL DIODES ARE IN4148
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE 1/4W -10%

Figure 7—16. Start Meas Delay And Notch Filter (Card 9) Schematic Diagram



00354

Figure 7—17. Option 4, 3-kHz Filter (Card 10) Component Location Diagram



I.C.	TYPE	GND	VCC
U1	SN7401N	7	14
U2	U6E7741393		
K1, 2	A-0086-10-122		

NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   ALL DIODES ARE IN4148.

SYSTEMS PROVIDING NOISE MEAS SENSITIVITY FROM 0dBrn TO 60dBrn

R2 = 887, 1%
R4 = 102K, 1%
R5 = 102K, 1%
C3 = 270pF.
C4 = 560 pF

Figure 7—18. Option 4, 3-kHz Filter (Card 10) Schematic Diagram

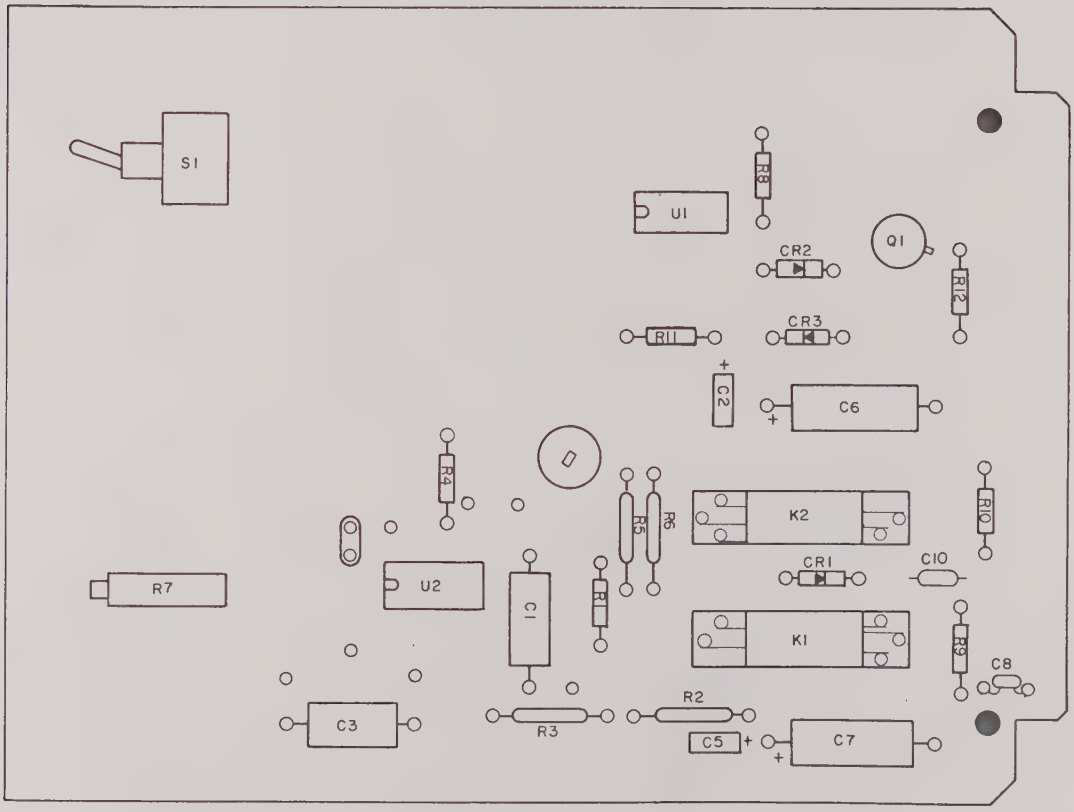
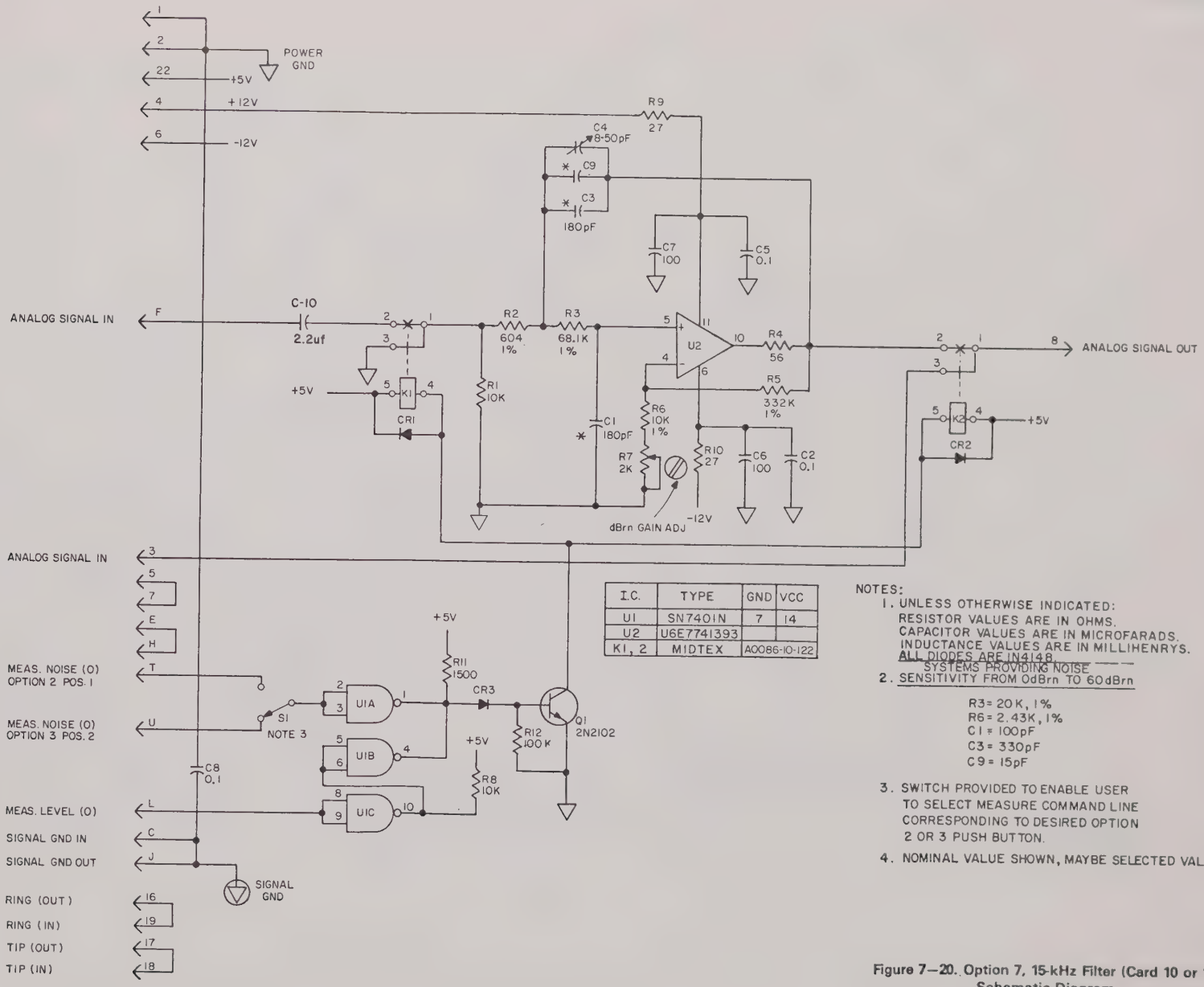


Figure 7—19. Option 7, 15-kHz (Card 10 or 11) Component Location Diagram



I.C.	TYPE	GND	VCC
U1	SN7401N	7	14
U2	U6E7741393		
K1, 2	MIDTEX	A0086-10-122	

NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   ALL DIODES ARE IN4148.
   SYSTEMS PROVIDING NOISE
2. SENSITIVITY FROM 0dBrn TO 60dBrn

   R3 = 20K, 1%
   R6 = 2.43K, 1%
   C1 = 100pF
   C3 = 330pF
   C9 = 15pF

3. SWITCH PROVIDED TO ENABLE USER TO SELECT MEASURE COMMAND LINE CORRESPONDING TO DESIRED OPTION 2 OR 3 PUSH BUTTON.
4. NOMINAL VALUE SHOWN, MAYBE SELECTED VALUE

Figure 7—20. Option 7, 15-kHz Filter (Card 10 or 11) Schematic Diagram

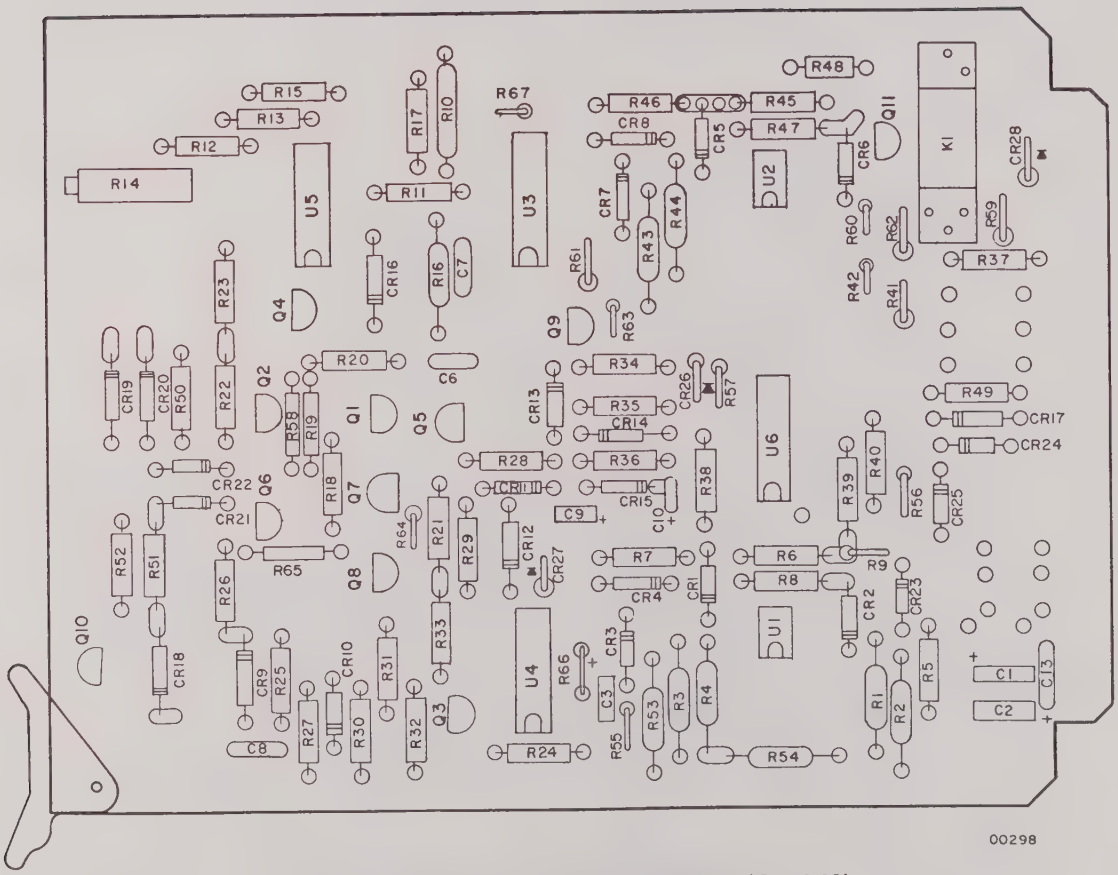
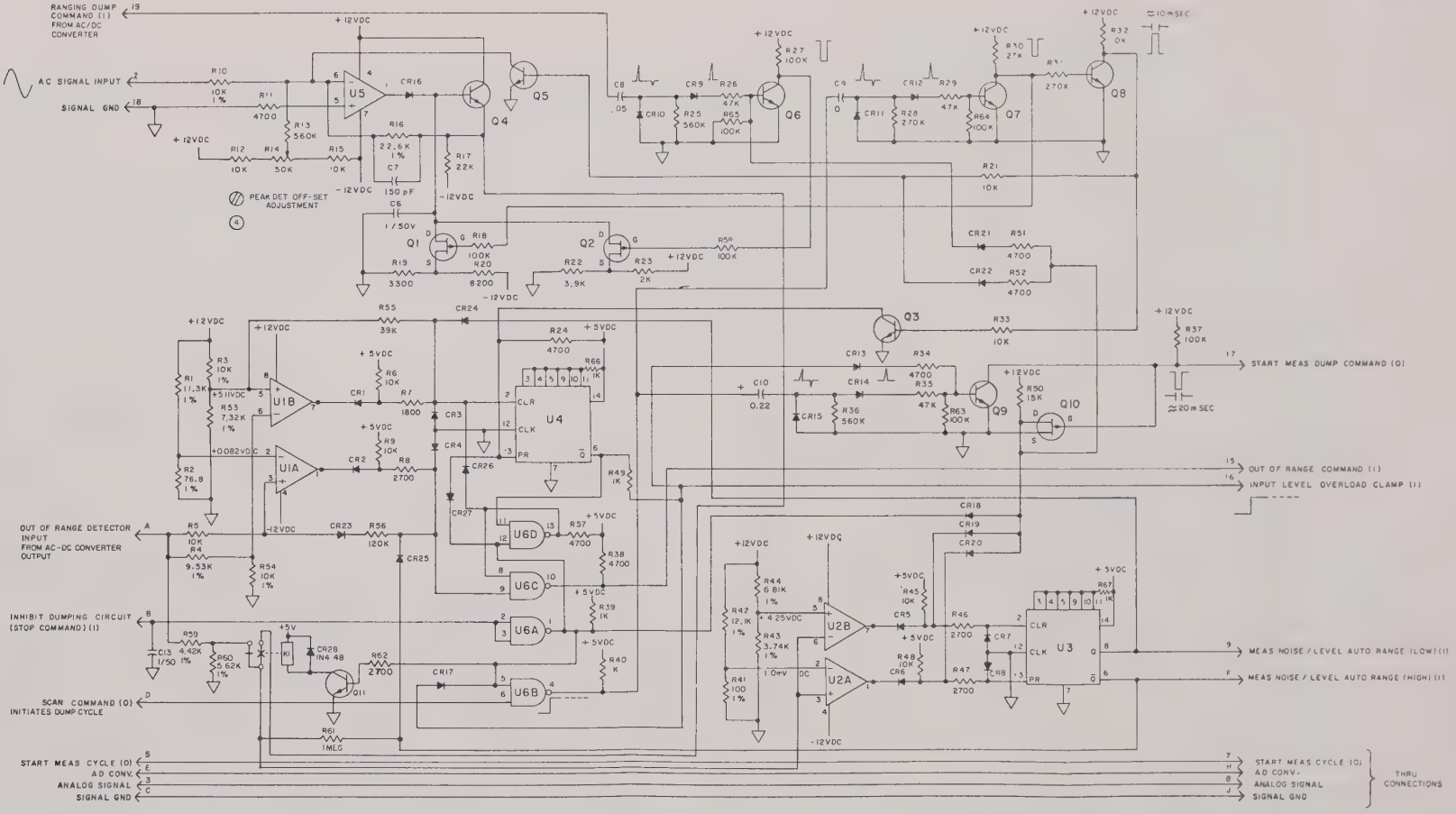


Figure 7—21. Ranging Signal Detector (Card 12)
Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS
2. DIODES CR1 THRU CR8, CR10, CR11, CR13, CR15, CR16, CR21, CR22, CR24, CR25 CR28, ARE TYPE IN4148. CR9, CR12, CR14, CR17 THRU CR20, CR26, CR27 ARE TYPE IN198. CR23 IS A 5082-2800 HOT CARRIED.
3. TRANSISTORS Q1, Q2 AND Q10 ARE TYPE 2N5461, Q3 THRU Q9, Q11 ARE TYPE MPS6515.

HIGHEST REFERENCE DESIGNATIONS		
R67	C13	CR28
Q11	U6	

REFERENCE DESIGNATIONS NOT USED		
C4-5		
C11-12		

I C.	TYPE	GND	VCC
U1	1458		
U2	1458		
U3 - U4	SN-7472N	7	14
U5	UJE 773-9393		
U6	SN-7401N	7	14

Figure 7—22. Ranging Signal Detector (Card 12) Schematic Diagram

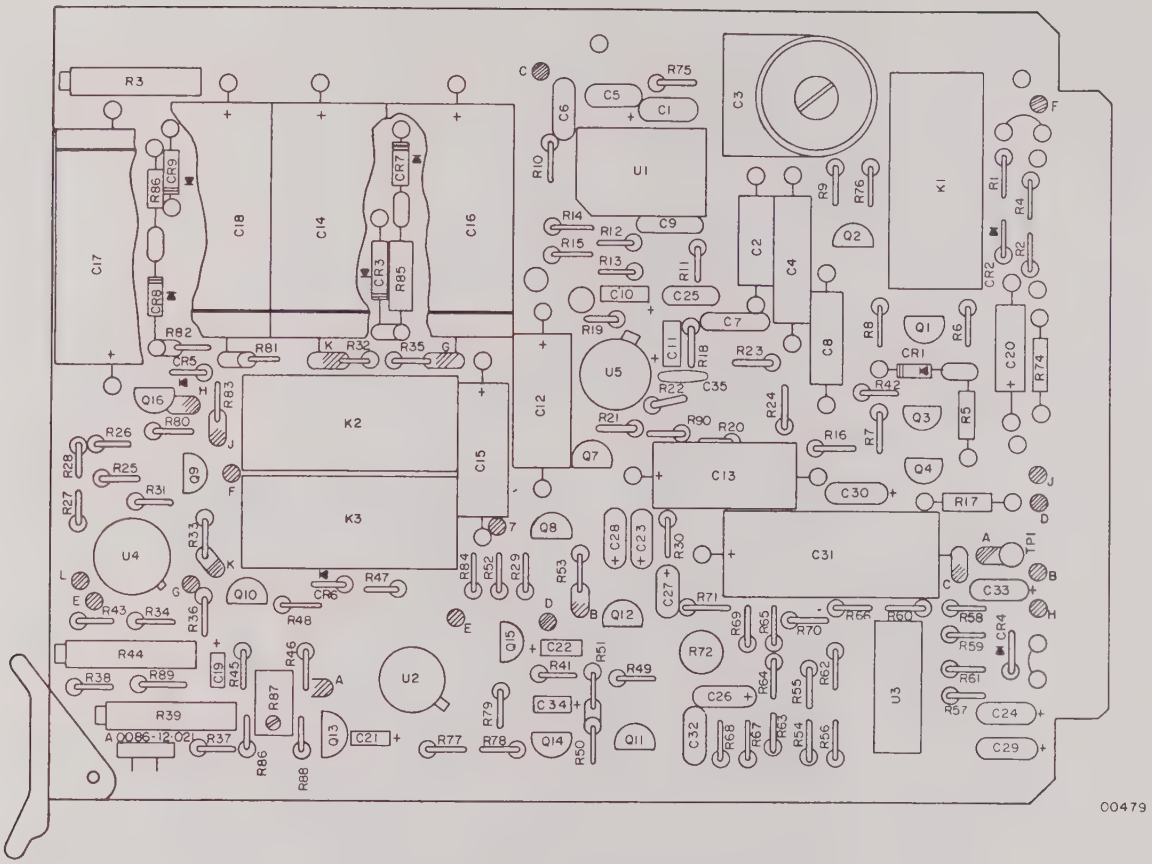


Figure 7—23. AC/DC Converter (Card 13) Component Location Diagram

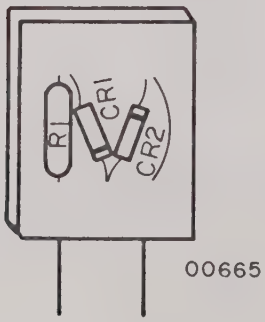
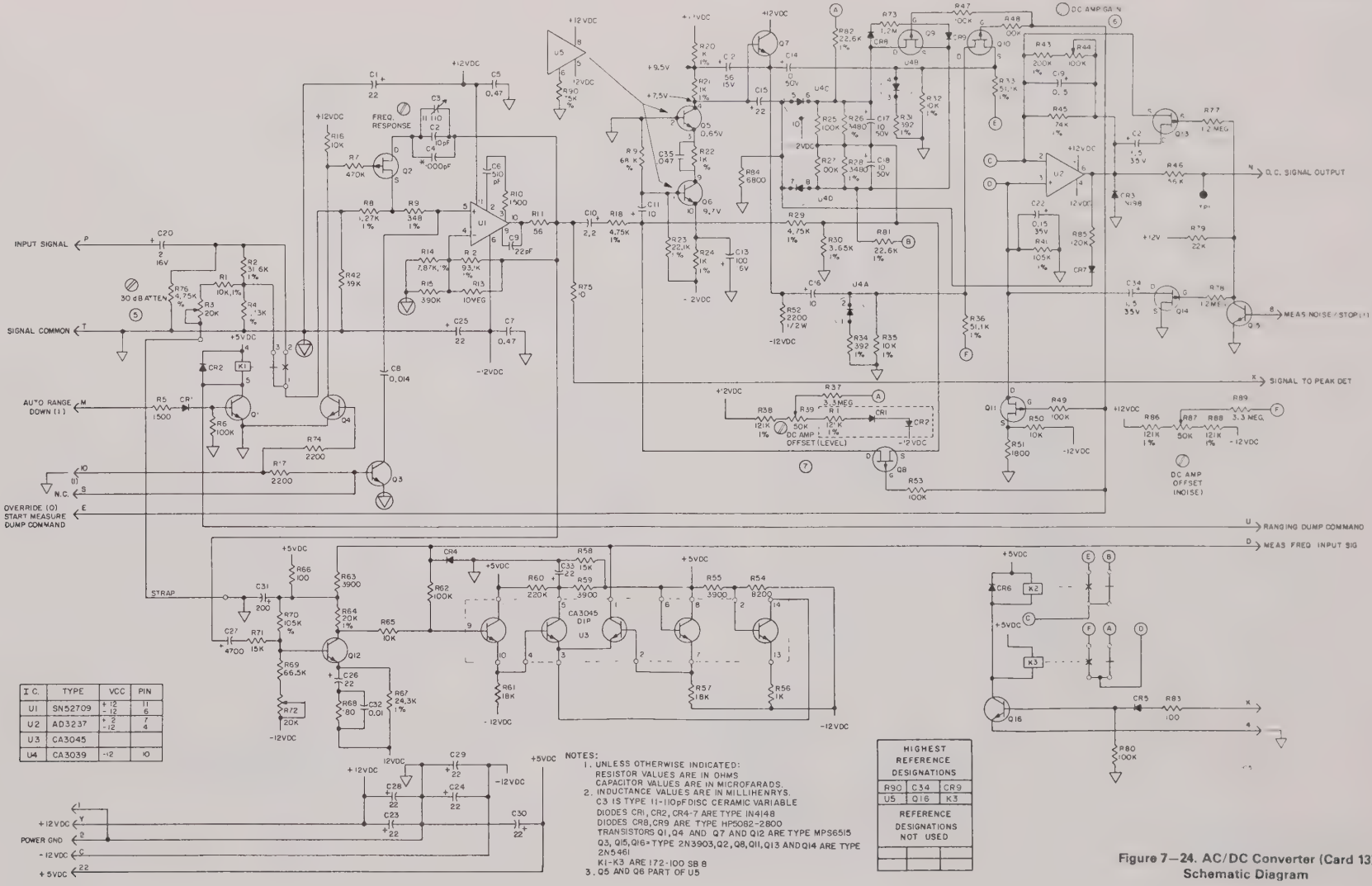


Figure 7—24. Temperature Compensation Network Component Location Diagram



I.C.	TYPE	VCC	PIN
U1	SN52709	+15 -12	11 6
U2	AD3237	+2 -12	7 4
U3	CA3045		
U4	CA3039	-12	10

NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN MICROFARADS.
2. INDUCTANCE VALUES ARE IN MILLIHENRYS.
   C3 IS TYPE 11-110pF DISC CERAMIC VARIABLE
   DIODES CR1, CR2, CR4-7 ARE TYPE IN4148
   DIODES CR8, CR9 ARE TYPE HP5082-2800
   TRANSISTORS Q1, Q4 AND Q7 AND Q12 ARE TYPE MPS6515
   Q3, Q15, Q16 = TYPE 2N3903, Q2, Q8, Q11, Q13 AND Q14 ARE TYPE 2N5461
   K1-K3 ARE 172-100 SB 8
3. Q5 AND Q6 PART OF U5

HIGHEST REFERENCE DESIGNATIONS		
R90	C34	CR9
U5	Q16	K3

REFERENCE DESIGNATIONS NOT USED

Figure 7—24. AC/DC Converter (Card 13) Schematic Diagram

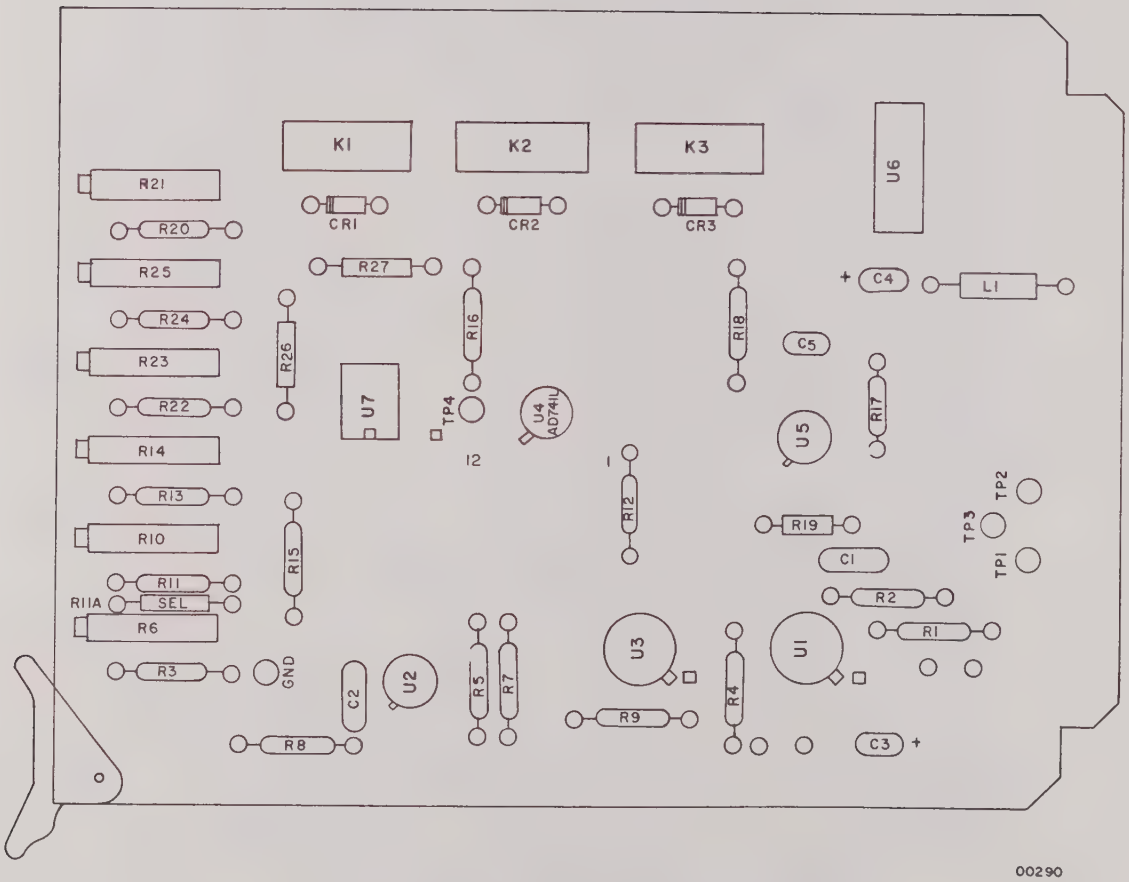
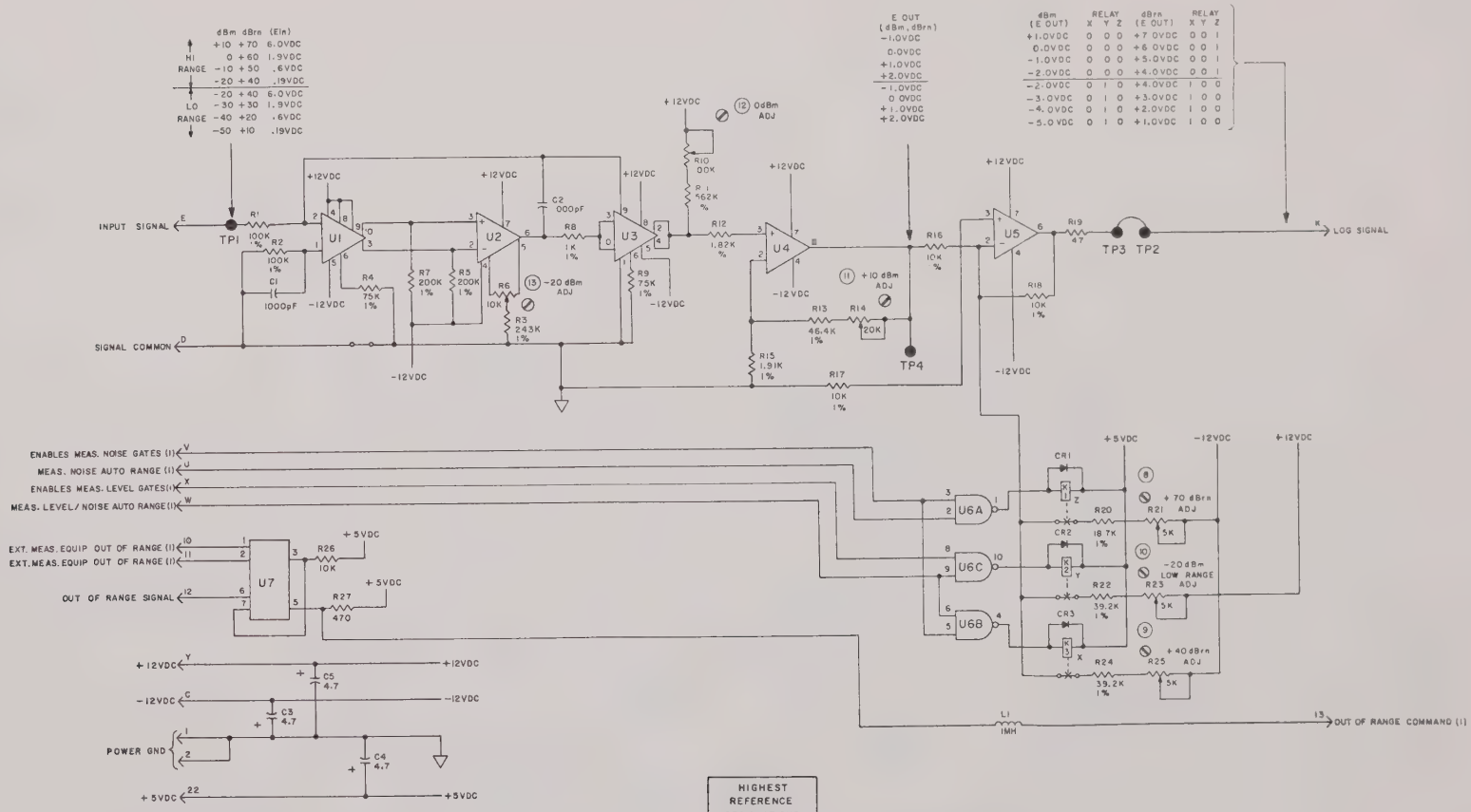


Figure 7—26. Logarithmic Converter (Card 14)
Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. UNLESS OTHERWISE INDICATED:
   DIODES ARE TYPE IN4148.

HIGHEST REFERENCE DESIGNATIONS		
R27	C5	CR3
K3	U7	

REFERENCE DESIGNATIONS NOT USED

I C.	TYPE	GND	VCC	-VCC
U1,U3	UA726			
U2,U5	UA741EHC			
U6	SN7400N	7	14	
U7	SN7545	4	8	
U4	AD3237		7	4

Figure 7–27. Logarithmic Converter (Card 14) Schematic Diagram

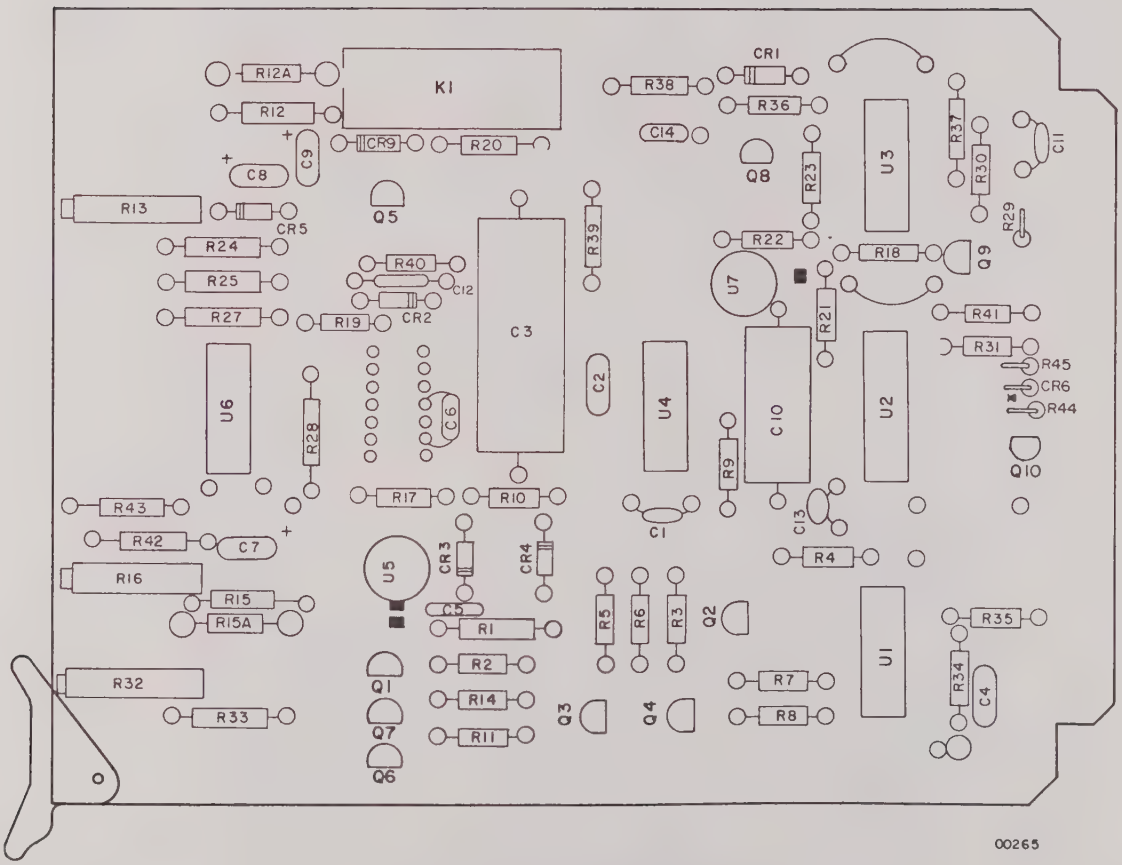
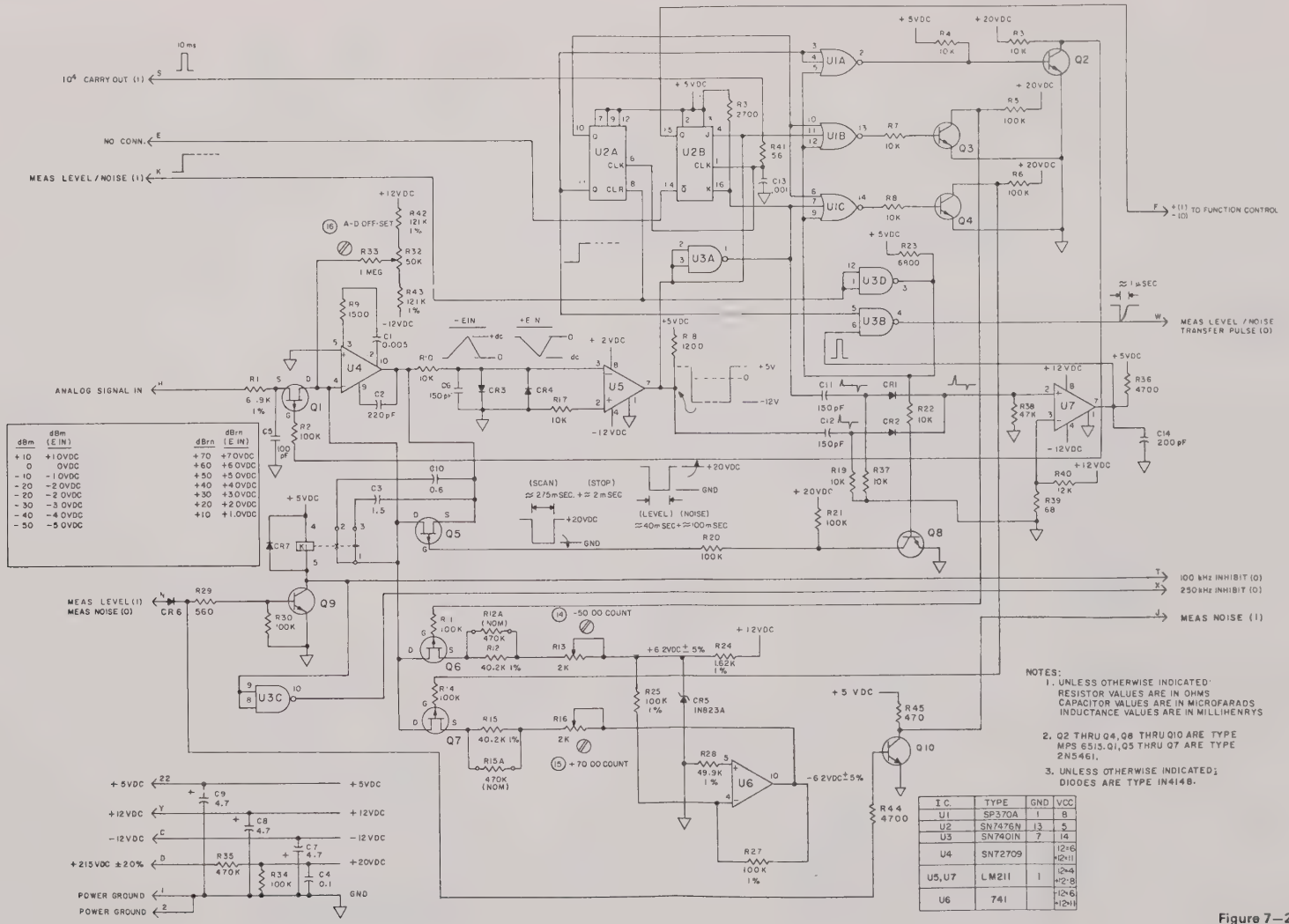


Figure 7—28. A/D Converter (Card 15)
Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED: RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS INDUCTANCE VALUES ARE IN MILLIHENRYS
2. Q2 THRU Q4, Q8 THRU Q10 ARE TYPE MPS 6515. Q1, Q5 THRU Q7 ARE TYPE 2N5461.
3. UNLESS OTHERWISE INDICATED; DIODES ARE TYPE IN4148.

HIGHEST REFERENCE DESIGNATIONS		
R45	C13	CR7
K1	Q10	U7
REFERENCE DESIGNATIONS NOT USED		
R26		

I.C.	TYPE	GND	VCC
U1	SP370A	1	8
U2	SN7476N	13	5
U3	SN7401N	7	14
U4	SN72709		12•6 +12•11
U5, U7	LM211	1	12•4 +12•8
U6	741		-12•6 +12•11

Figure 7—29. A/D Converter (Card 15) Schematic Diagram

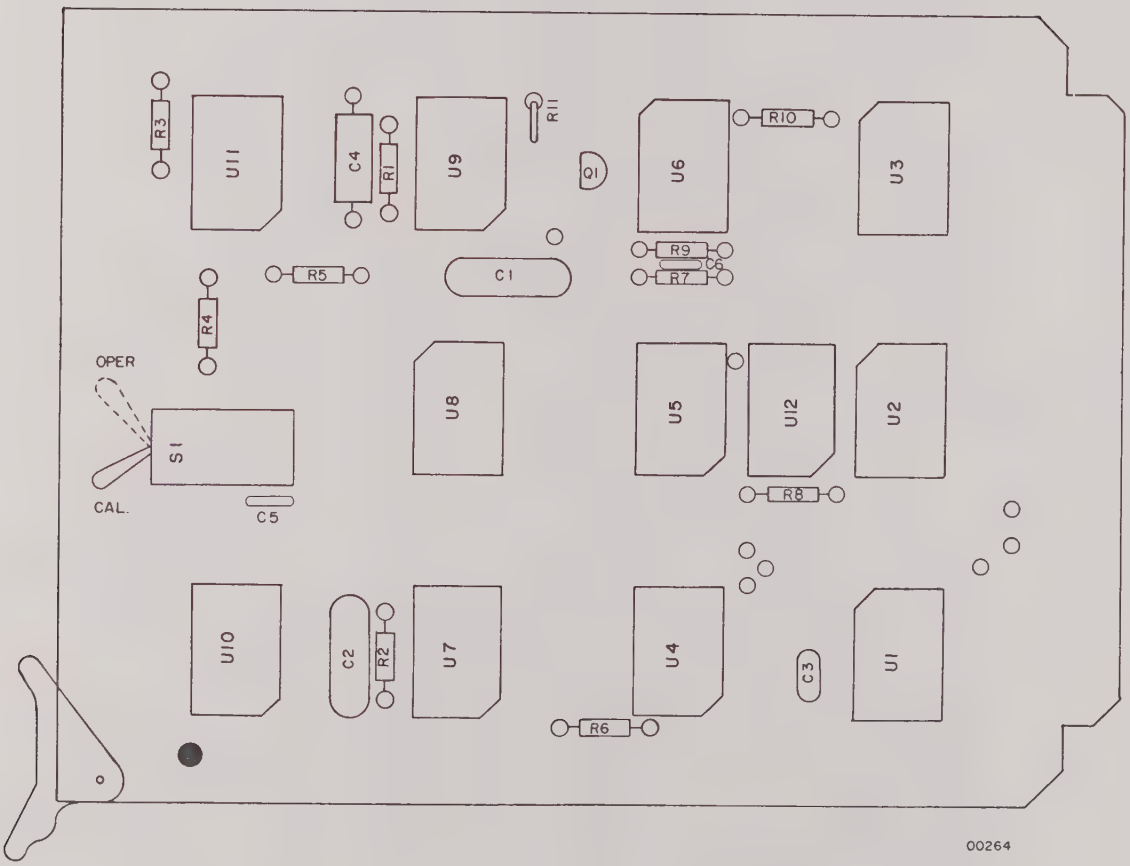
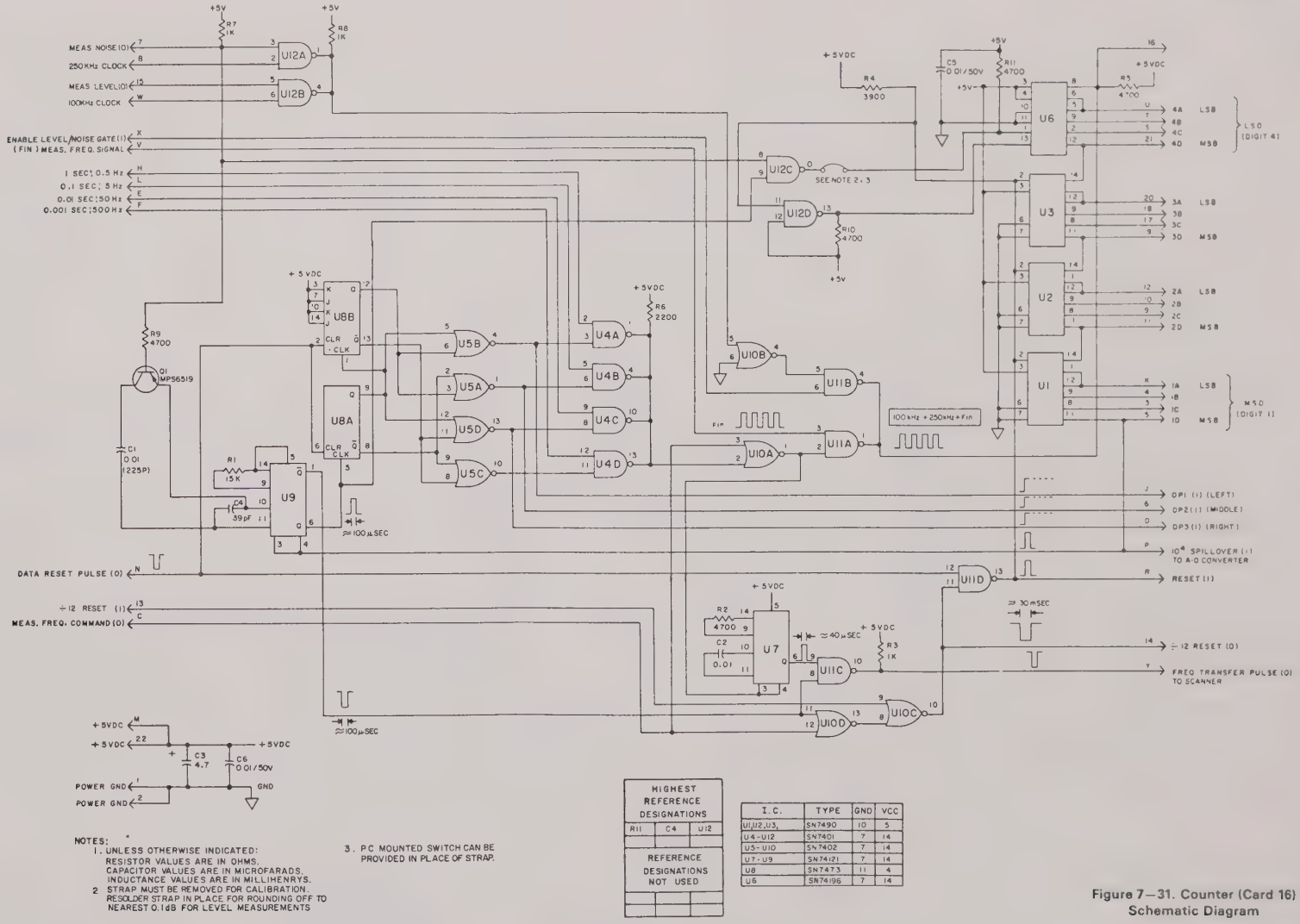


Figure 7—30. Counter (Card 16) Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. STRAP MUST BE REMOVED FOR CALIBRATION. RESOLDER STRAP IN PLACE FOR ROUNDING OFF TO NEAREST 0.1dB FOR LEVEL MEASUREMENTS
3. P.C. MOUNTED SWITCH CAN BE PROVIDED IN PLACE OF STRAP.

HIGHEST REFERENCE DESIGNATIONS		
R11	C4	U12
REFERENCE DESIGNATIONS NOT USED		

I.C.	TYPE	GND	VCC
U1,U2,U3,	SN7490	10	5
U4-U12	SN7401	7	14
U5-U10	SN7402	7	14
U7-U9	SN74121	7	14
U8	SN7473	11	4
U6	SN74196	7	14

Figure 7—31. Counter (Card 16) Schematic Diagram

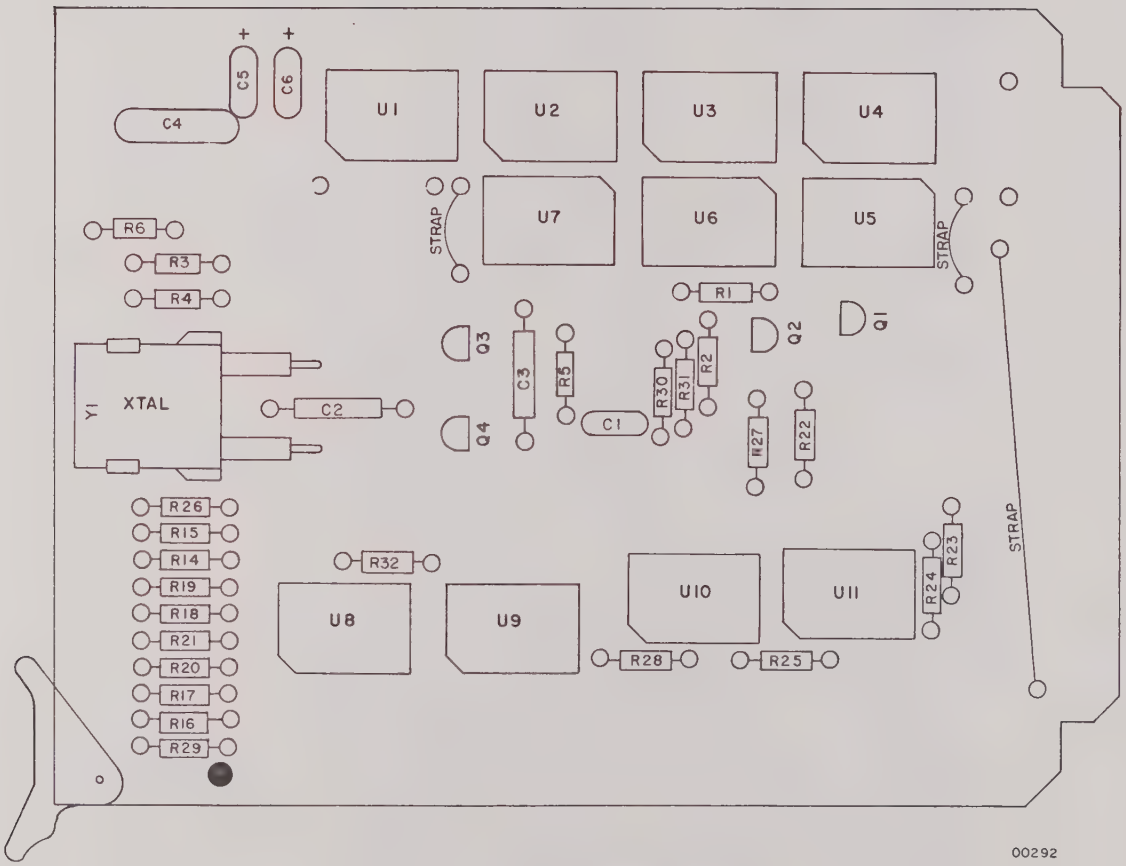
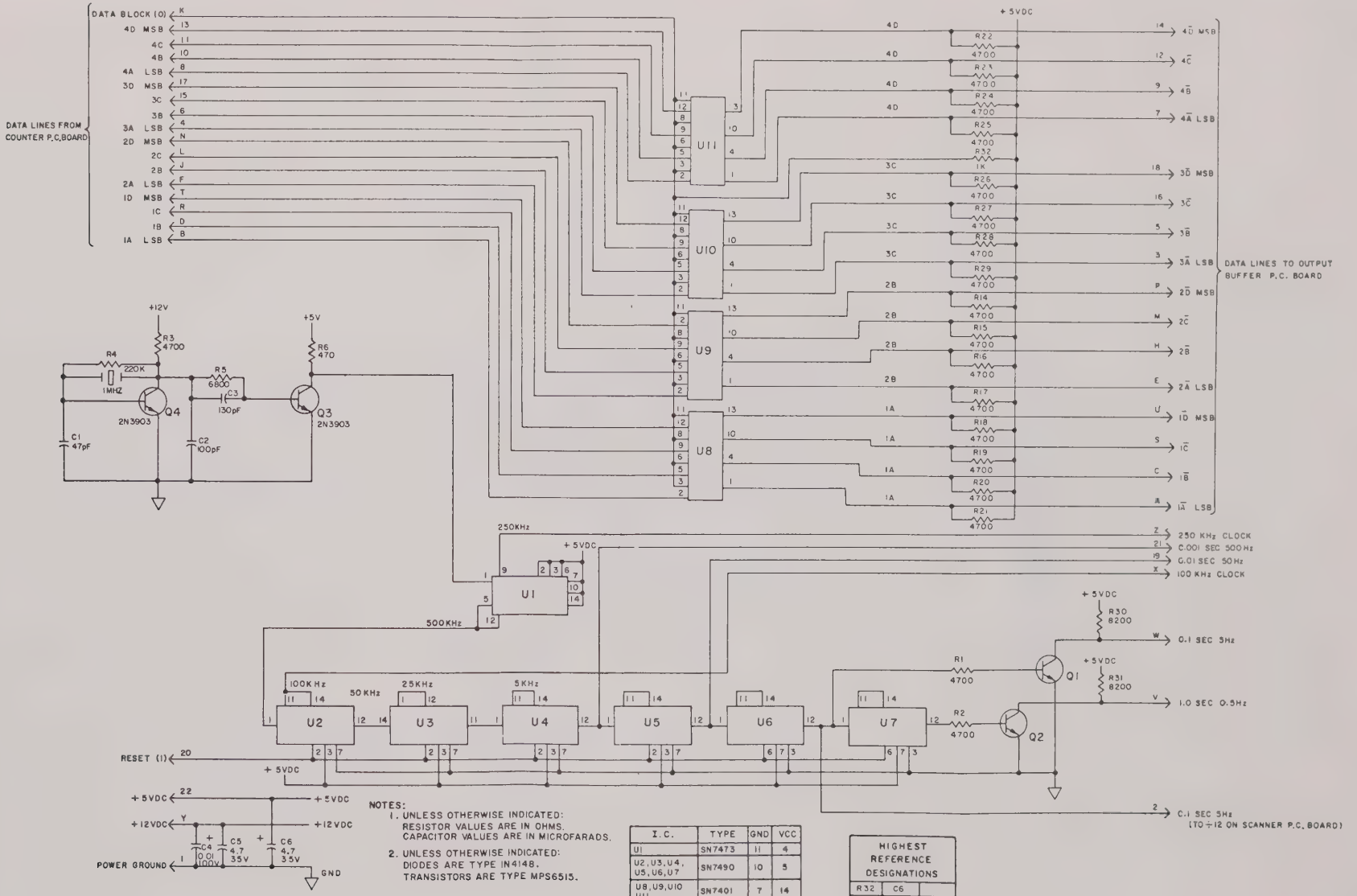


Figure 7—32. Time Base (Card 17)
Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED: RESISTOR VALUES ARE IN OHMS. CAPACITOR VALUES ARE IN MICROFARADS.
2. UNLESS OTHERWISE INDICATED: DIODES ARE TYPE IN4148. TRANSISTORS ARE TYPE MPS6515.

I.C.	TYPE	GND	VCC
U1	SN7473	11	4
U2, U3, U4, U5, U6, U7	SN7490	10	5
U8, U9, U10 U11	SN7401	7	14

HIGHEST REFERENCE DESIGNATIONS		
R32	C6	
Q4	U11	
REFERENCE DESIGNATIONS NOT USED		
	C7	
R7 THRU R13		

Figure 7—33. Time Base (Card 17) Schematic Diagram

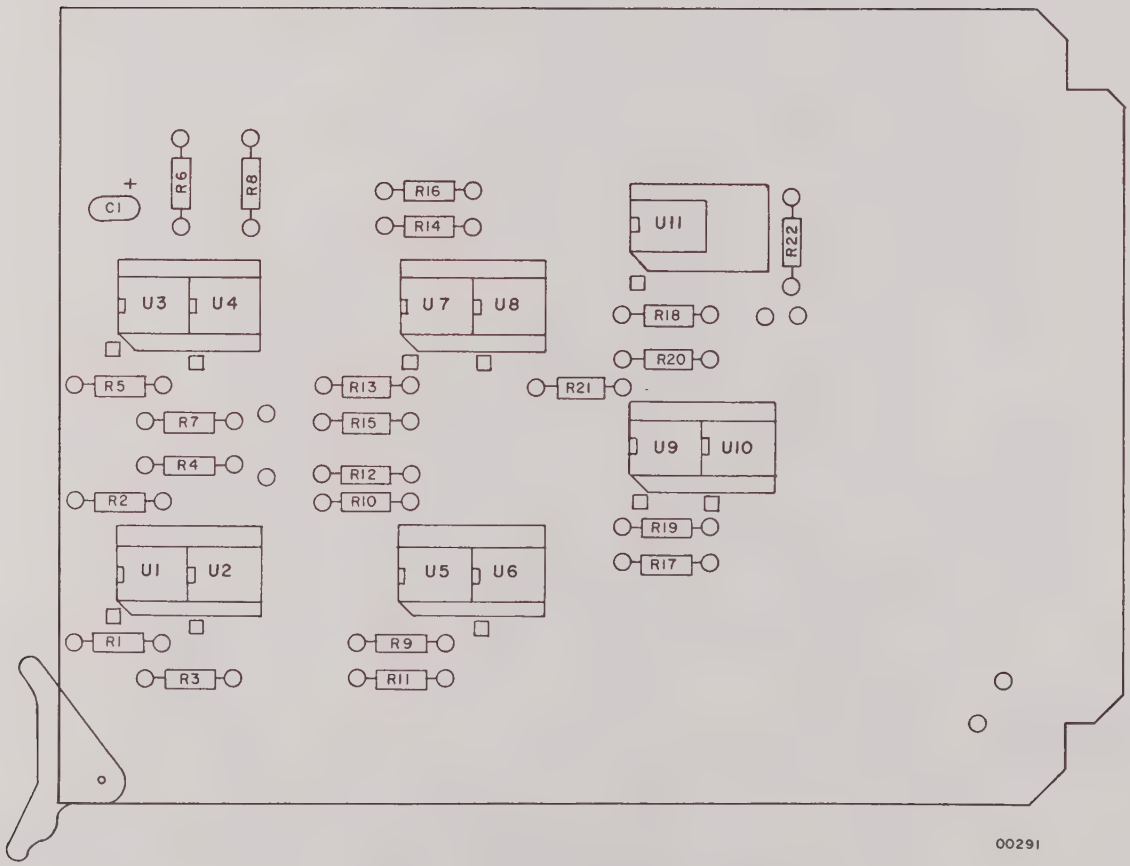
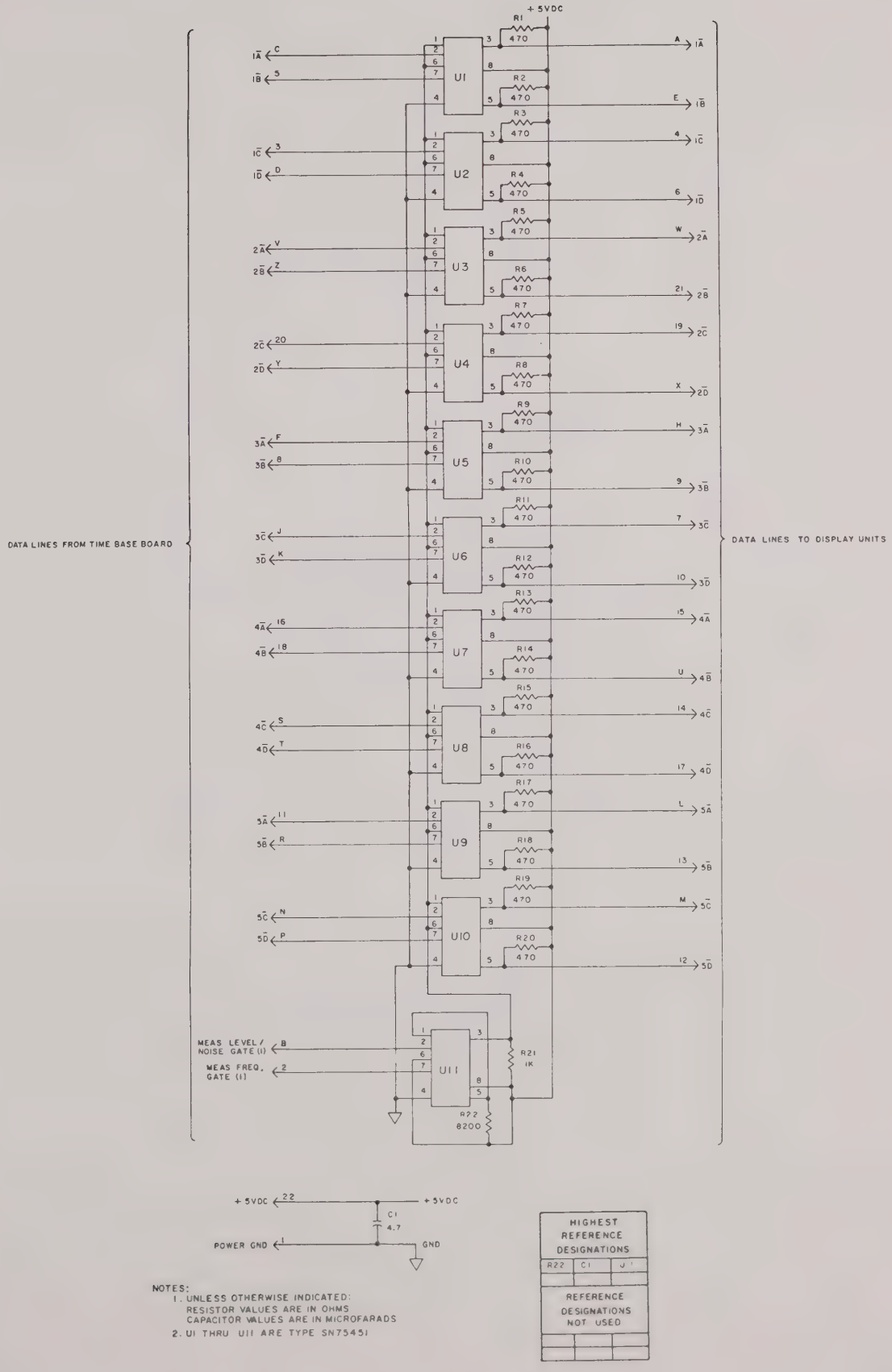


Figure 7—34. Output Buffer (Card 18) Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN MICROFARADS
2. U1 THRU U11 ARE TYPE SN7545I

Figure 7–35. Output Buffer (Card 18) Schematic Diagram

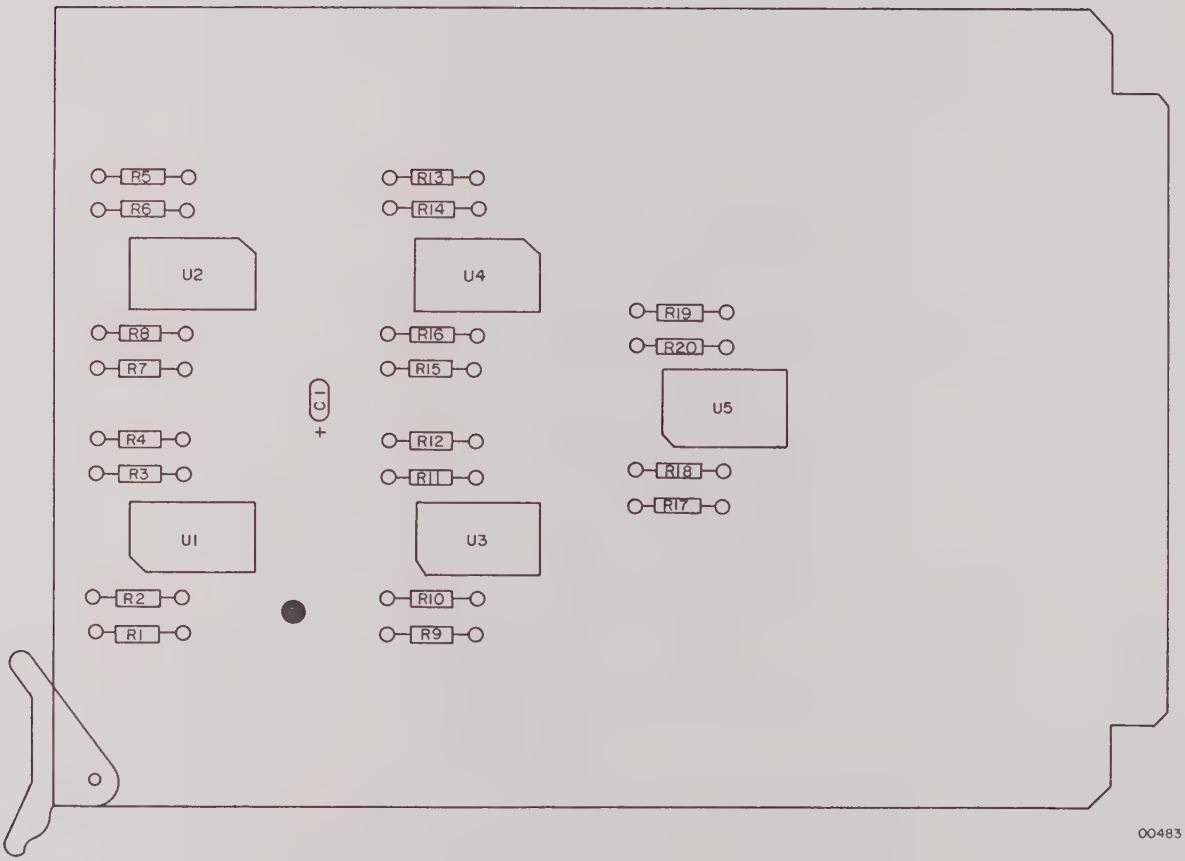
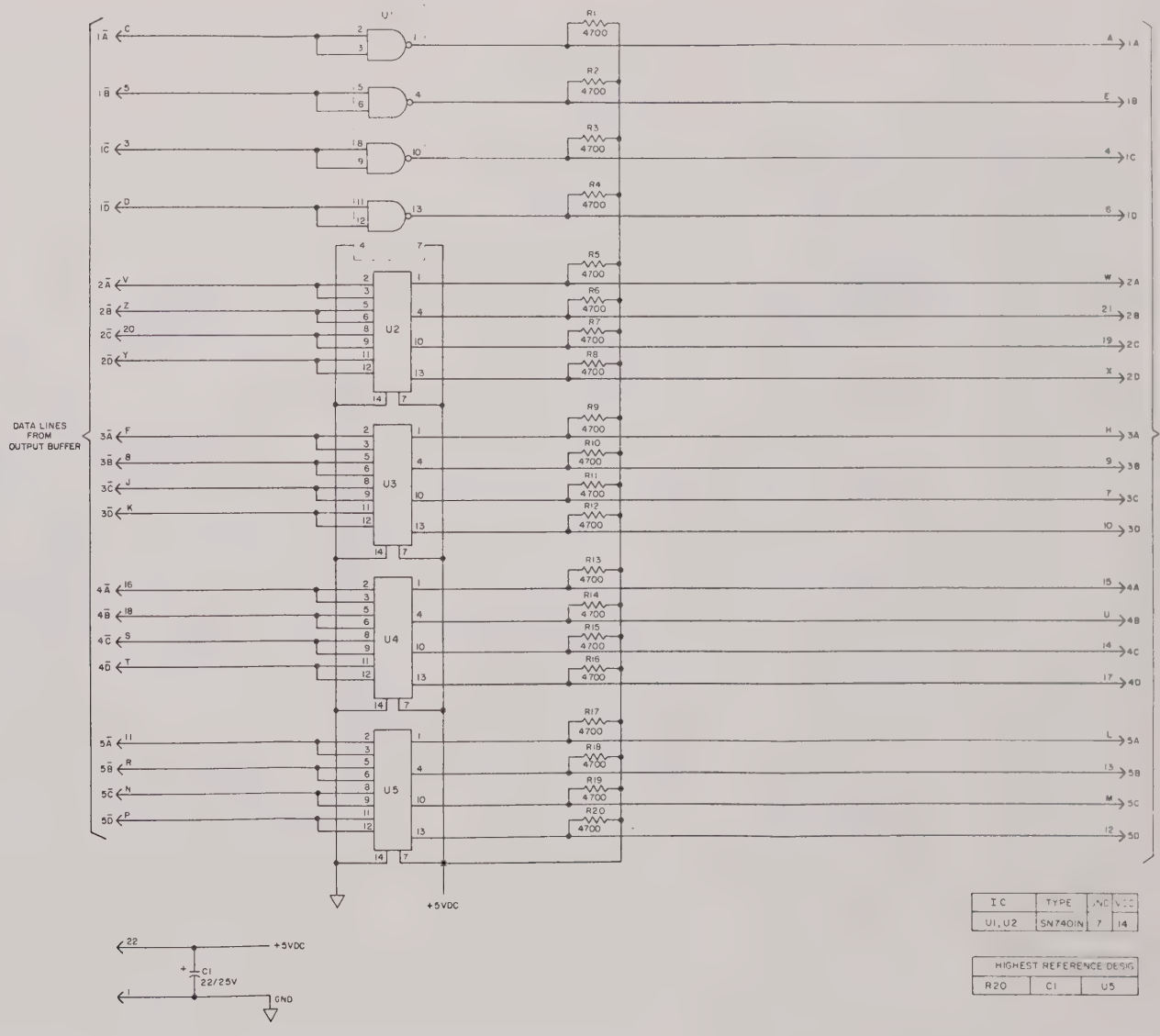


**Figure 7—36. External Recorder Buffer (Card 19)
Component Location Diagram**



IC	TYPE	GND	VCC
U1, U2	SN7401N	7	14

HIGHEST REFERENCE DESIG		
R20	C1	U5

Figure 7—37. External Recorder Buffer (Card 19) Schematic Diagram

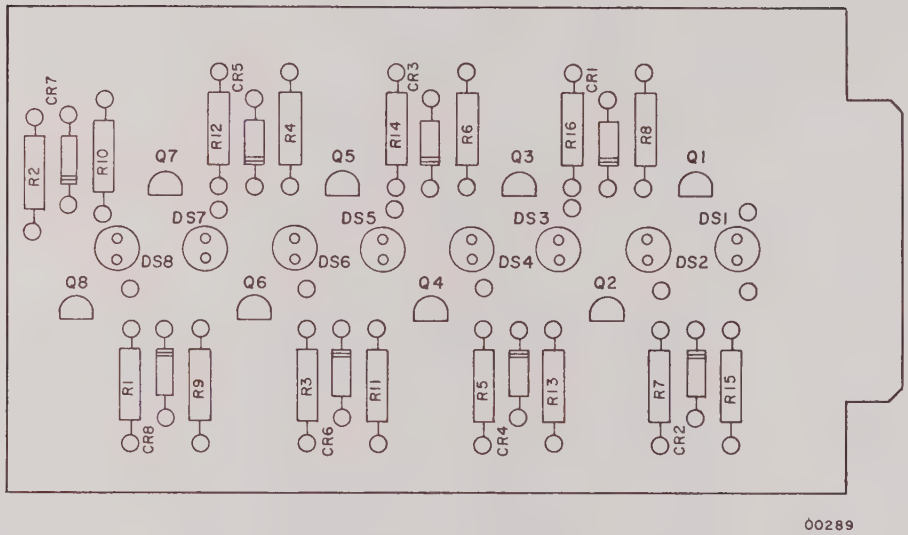
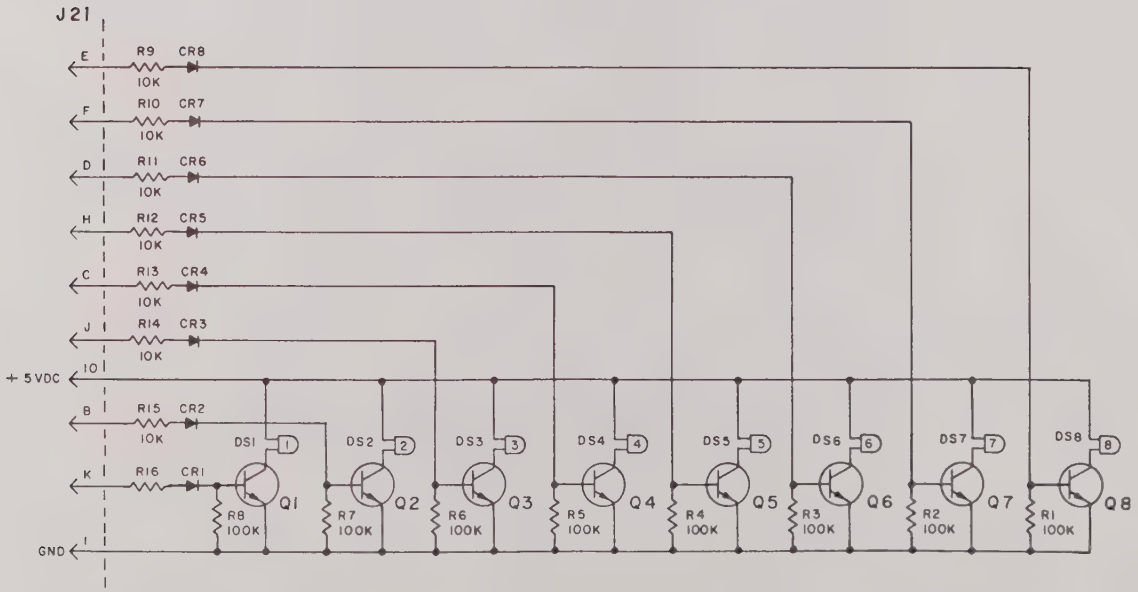


Figure 7—38. Scan Lamp Display Component Location Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.

2. UNLESS OTHERWISE INDICATED:
   DIODES ARE TYPE IN4148.
   TRANSISTORS ARE TYPE MPS6515.

Figure 7—39. Scan Lamp Display Schematic Diagram

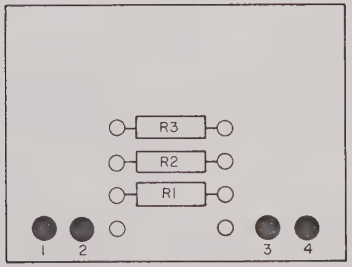


Figure 7—40. Impedance Equalizer Component Location Diagram

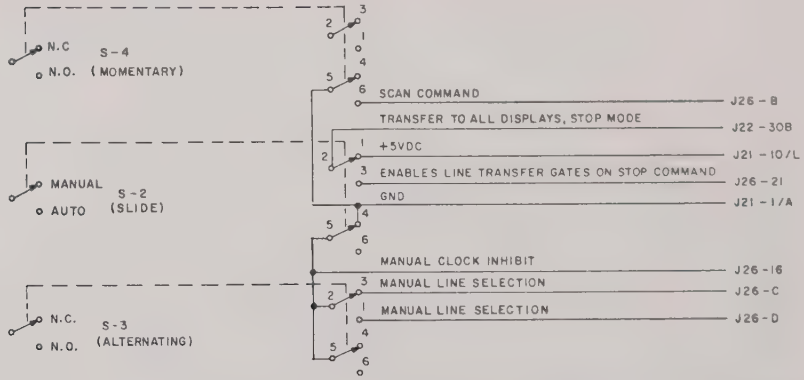


Figure 7—41. Scan Mode Switching Schematic Diagram

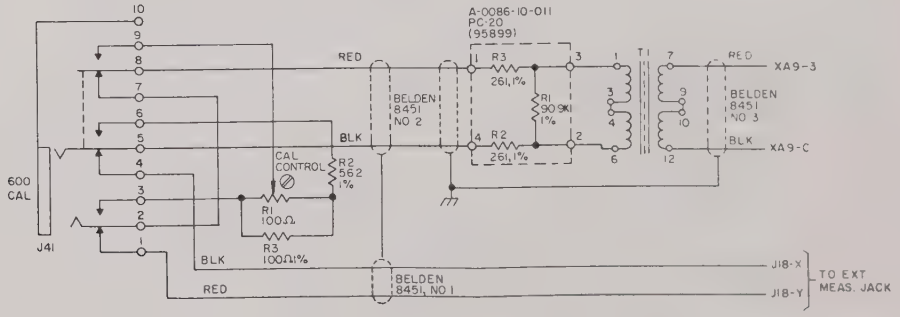


Figure 7—42. Common Equipment Input Circuit Schematic Diagram

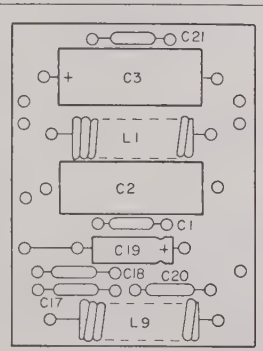


Figure 7—43. CB-1 Filter Component Location Diagram

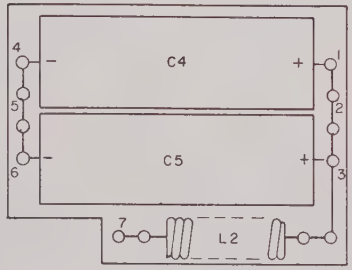


Figure 7—44. CB-2 Filter Component Location Diagram

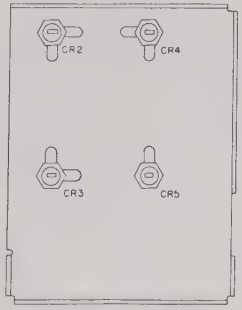


Figure 7—45. Rectifier Diodes Component Location Diagram

Figure 7—46. Switching Transistor Component Location Diagram

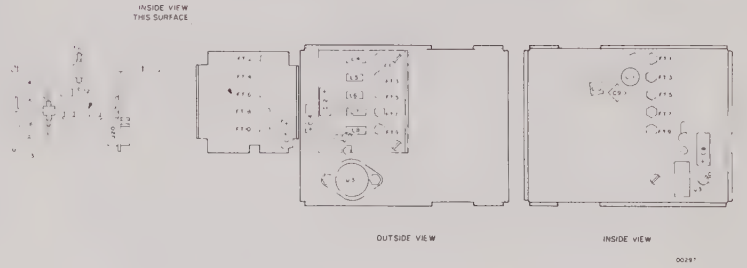


Figure 7—47. Output Module Component Location Diagram

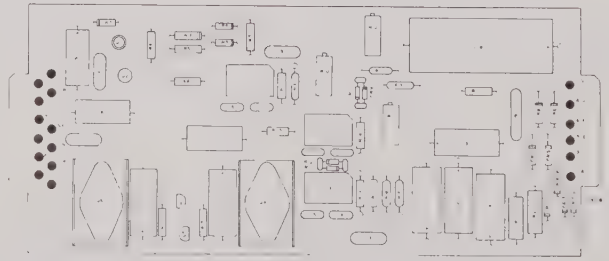


Figure 7—48. PC Board E95957 Component Location Diagram

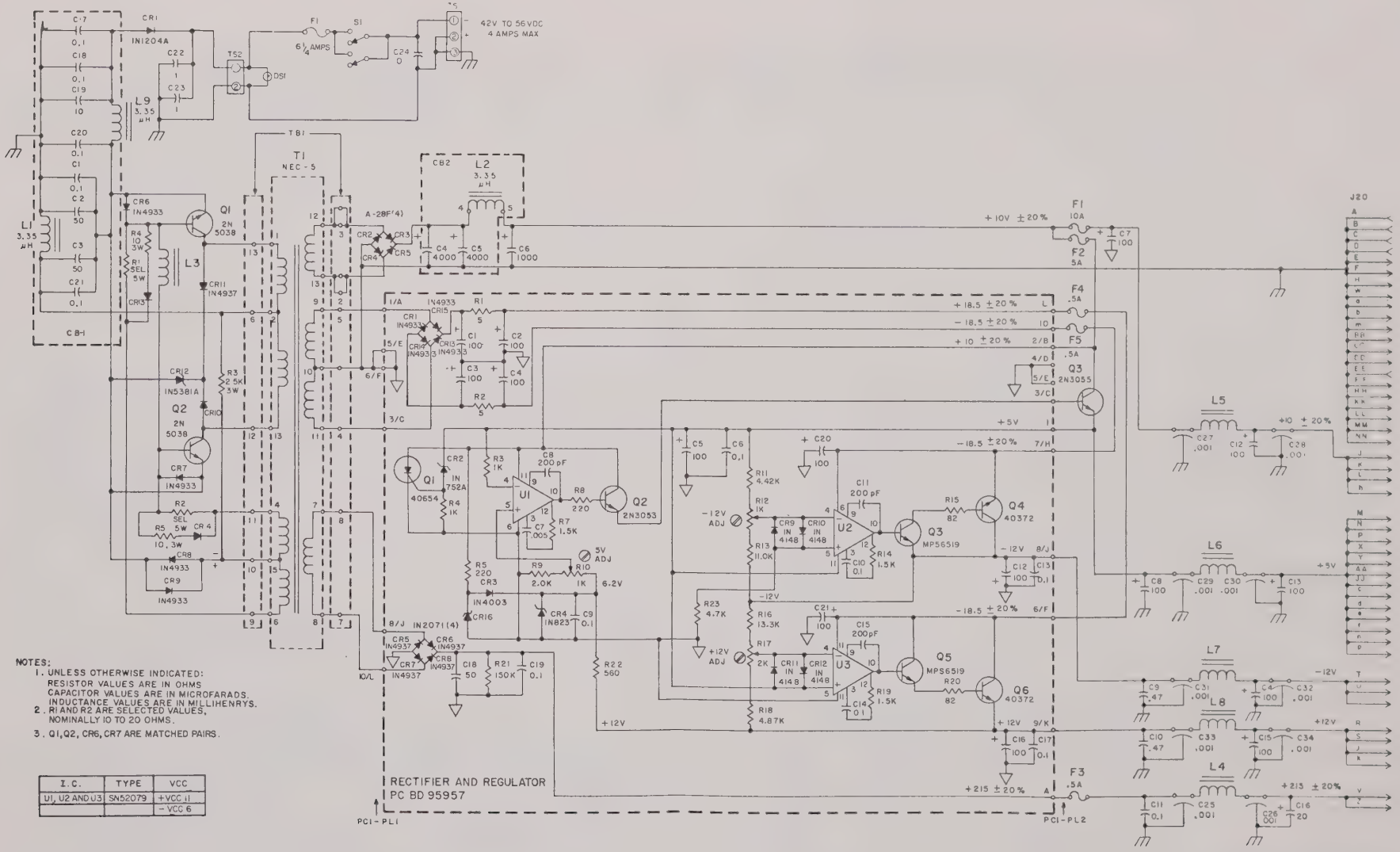

42V TO 56VDC
4 AMPS MAX
RECTIFIER AND REGULATOR
PC BD 95957
PCI-PL1
PCI-PL2
NOTES:
1. UNLESS OTHERWISE INDICATED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. R1 AND R2 ARE SELECTED VALUES, NOMINALLY 10 TO 20 OHMS.
3. Q1, Q2, CR6, CR7 ARE MATCHED PAIRS.
I.C. | TYPE | VCC
U1, U2 AND U3 | SN52079 | +VCC 11
| | - VCC 6

Figure 7—49. Model 8620
Overall Schematic Diagram

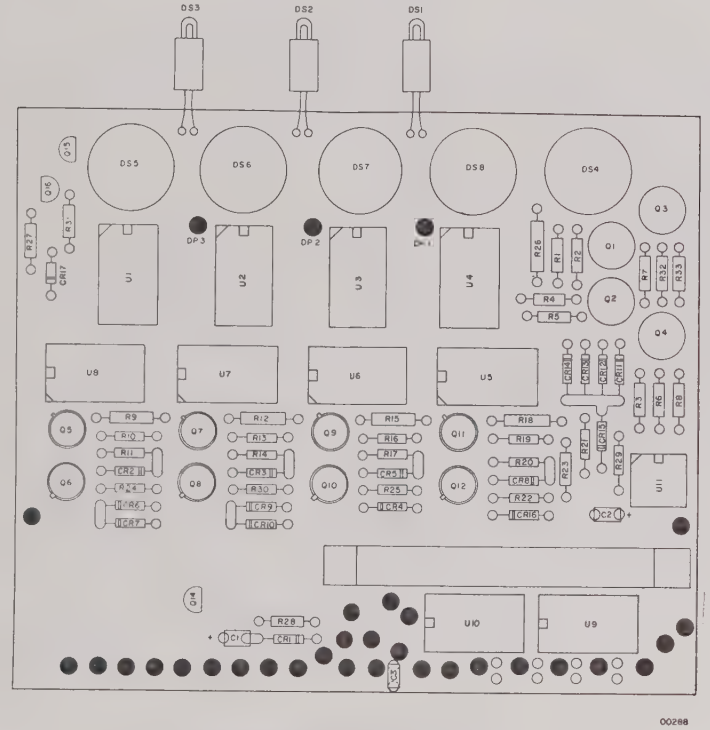


Figure 7—50. Model 8630 Readout Board Component Location Diagram

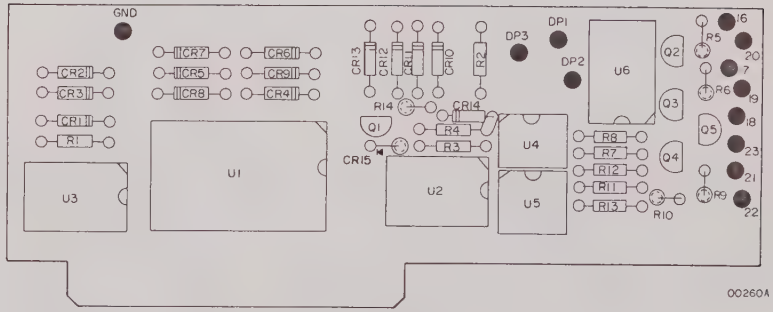
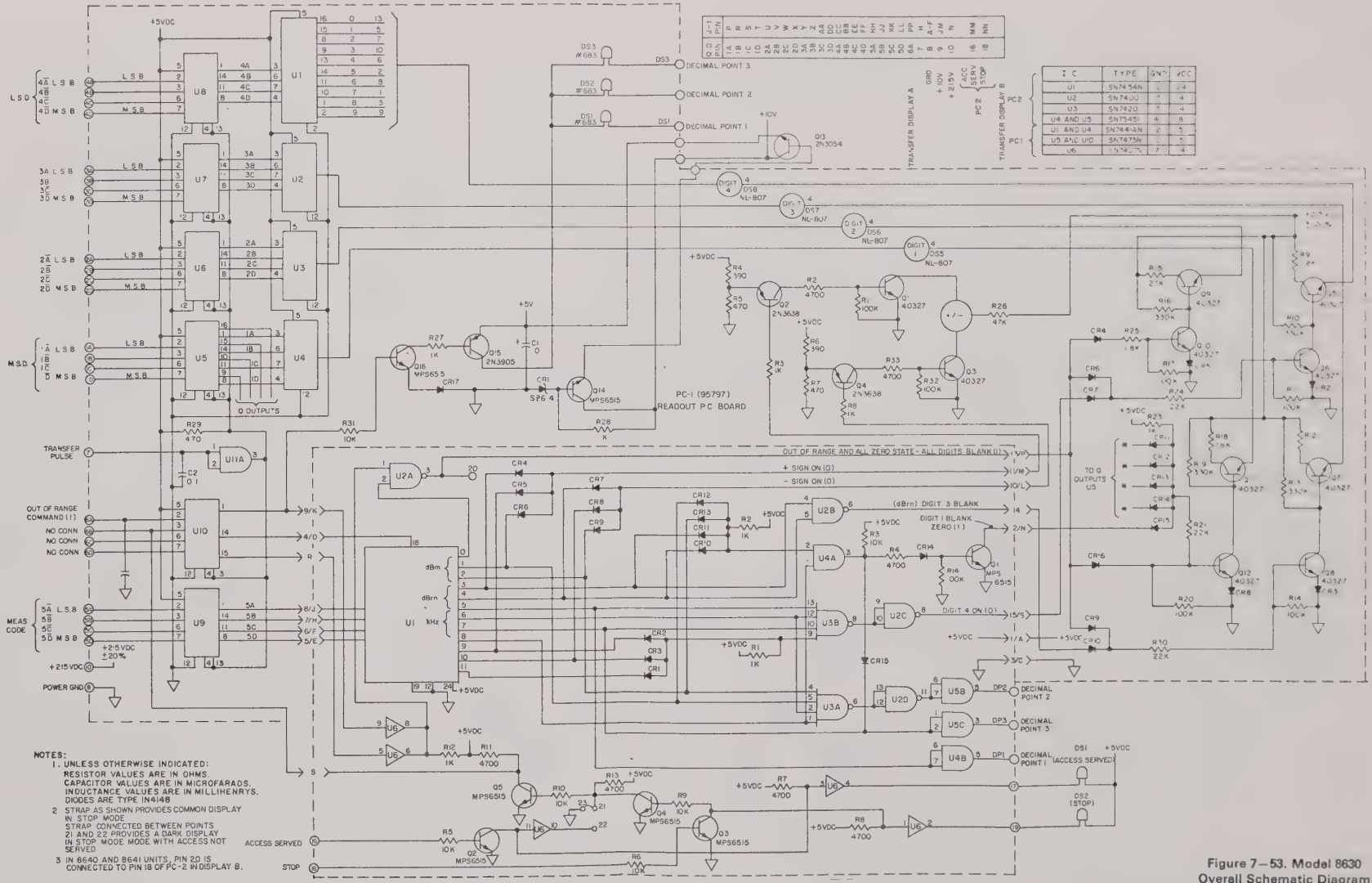


Figure 7—51. Model 8630 Decoder Board Component Location Diagram

											OPTIONAL FUNCTIONS				NUMBER DISPLAY			
											OPTION	OPTION	OPTION	OPTION				
LINE	D	C	B	A	dBm	dBrn	KHZ	DP1	DP2	DP3	+	−	HARM. DIST. % BRK Ø JITTER	+ GROUP DELAY	− GROUP DELAY		DIGIT 1	DIGIT 2	DIGIT 3	DIGIT 4
0	0	0	0	0	DISPLAY BLANKED COMPLETELY (REQUEST MINUS MEAS COMMAND)															
1	0	0	0	1																
2	0	0	1	0																
3	0	0	1	1																
4	0	1	0	0																
5	0	1	0	1																
6	0	1	1	0																
7	0	1	1	1																
8	1	0	0	0																
9	1	0	0	1																
10	1	0	1	0																
11	1	0	1	1	SPARE															
12	1	1	0	0	SPARE															
13	1	1	0	1	SPARE															
14	1	1	1	0	SPARE															
15	1	1	1	1	SPARE															

NOTE: LEADING DIGIT IS EXTINGUISHED WHEN READING IS LESS THAN 10

Figure 7—52. Function Table



I C	TYPE	GND	VCC
U1	SN7454N	7	14
U2	SN7400	7	14
U3	SN7420	7	14
U4 AND U5	SN75451	4	8
U1 AND U4	SN74143N	12	5
U5 AND U10	SN7475N	8	4
U6	SN7404N	7	14

NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   DIODES ARE TYPE 1N4148
2. STRAP AS SHOWN PROVIDES COMMON DISPLAY IN STOP MODE.
   STRAP CONNECTED BETWEEN POINTS 21 AND 22 PROVIDES A DARK DISPLAY IN STOP MODE MODE WITH ACCESS NOT SERVED
3. IN 8640 AND 8641 UNITS, PIN 20 IS CONNECTED TO PIN 18 OF PC-2 IN DISPLAY B.

Figure 7–53. Model 8630 Overall Schematic Diagram

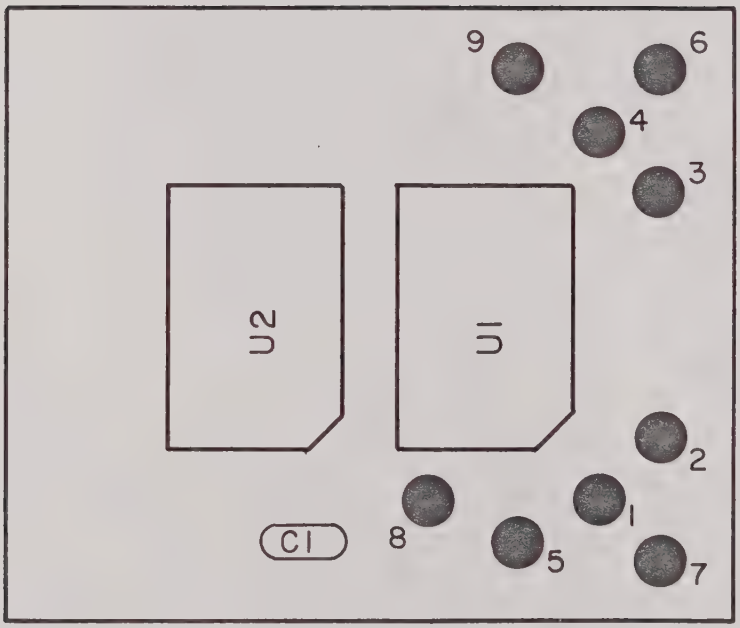


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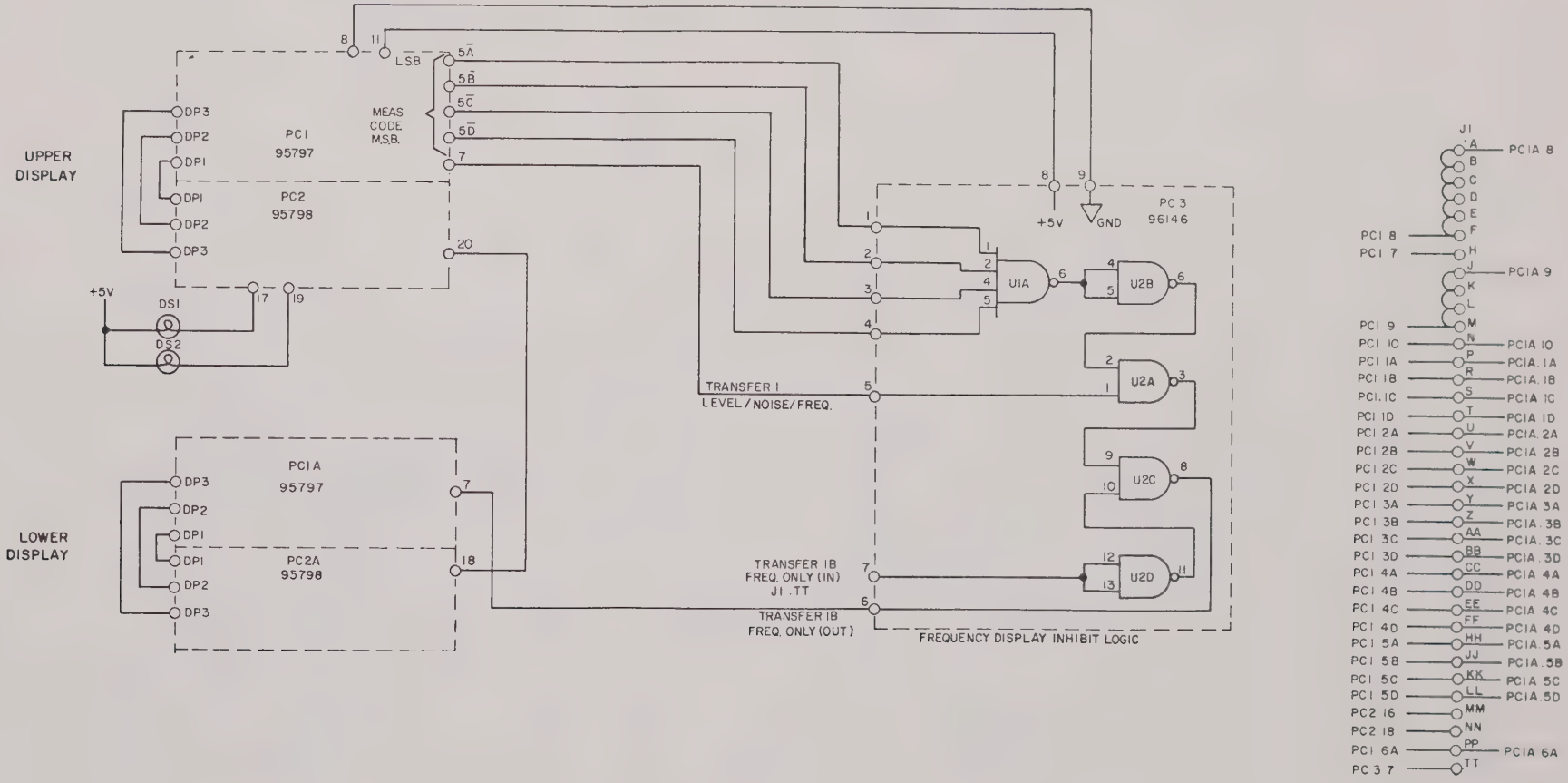
Figure 7—54. Model 8640, PC3 Component Location Diagram



00579

NOTE:
1. PCI, PCIA, PC2, PC2A: REFER TO MODEL 8630 SCHEMATIC, FIG. 7-22.

I.C.	VCC	GND	TYPE
U1	14	7,8	SN7440
U2	14	7	SN7400

Figure 7—55. Model 8640/8641 Overall Schematic Diagram

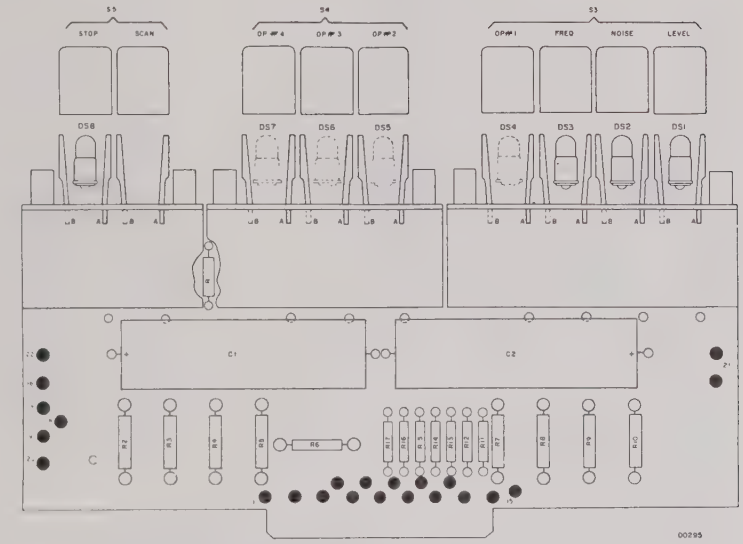


Figure 7—56. Model 8650 Function Selector, PC1
Component Location Diagram

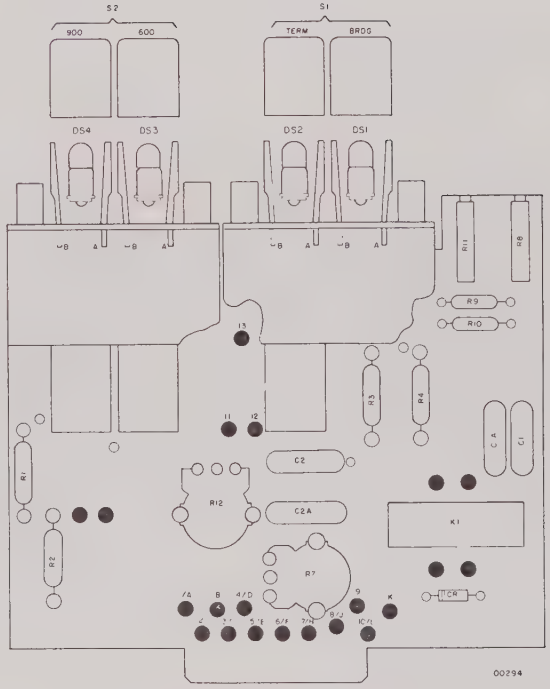


Figure 7—57. Model 8650 Impedance Selector, PC2
Component Location Diagram

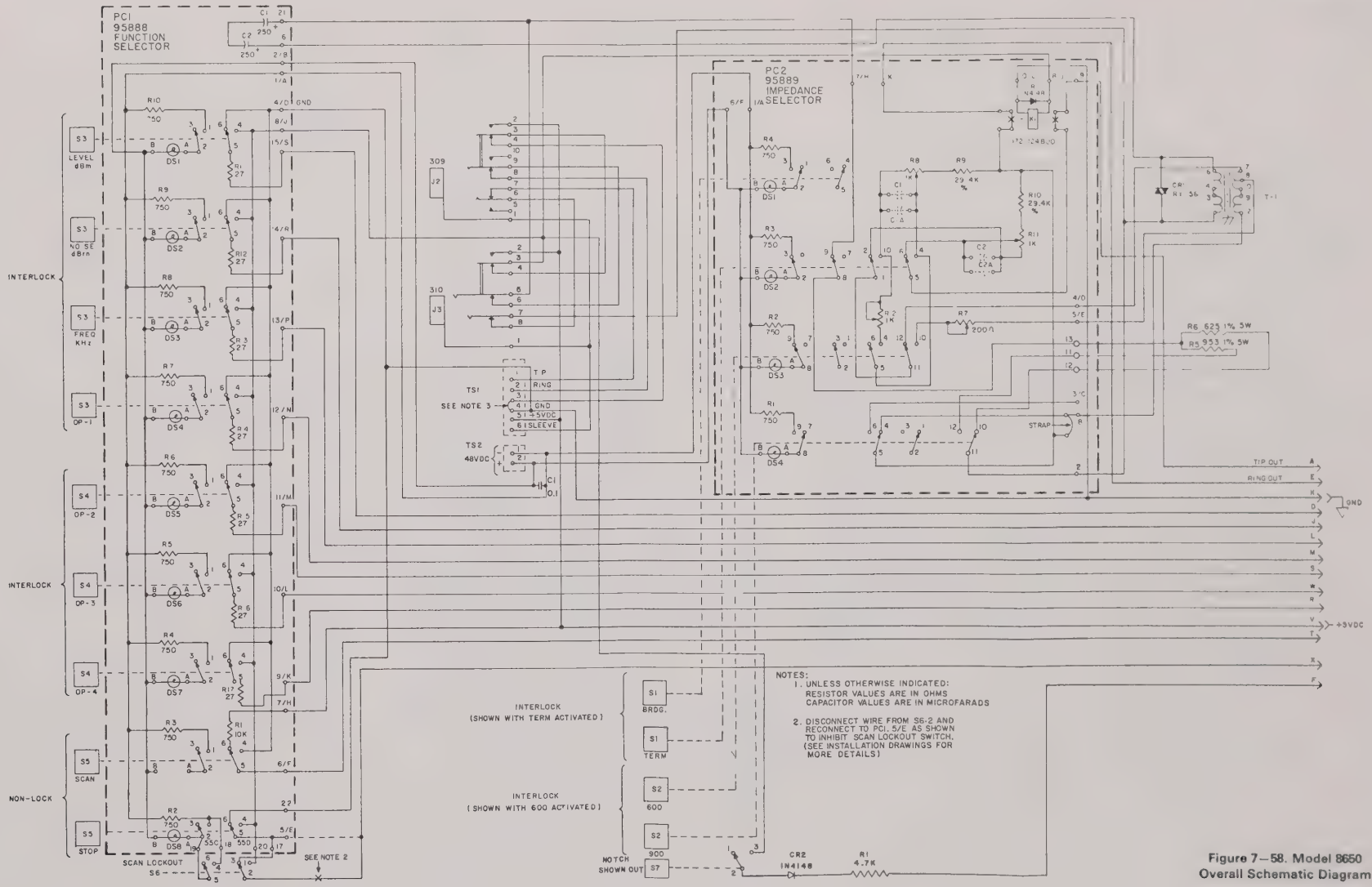


Figure 7—58. Model 8650 Overall Schematic Diagram

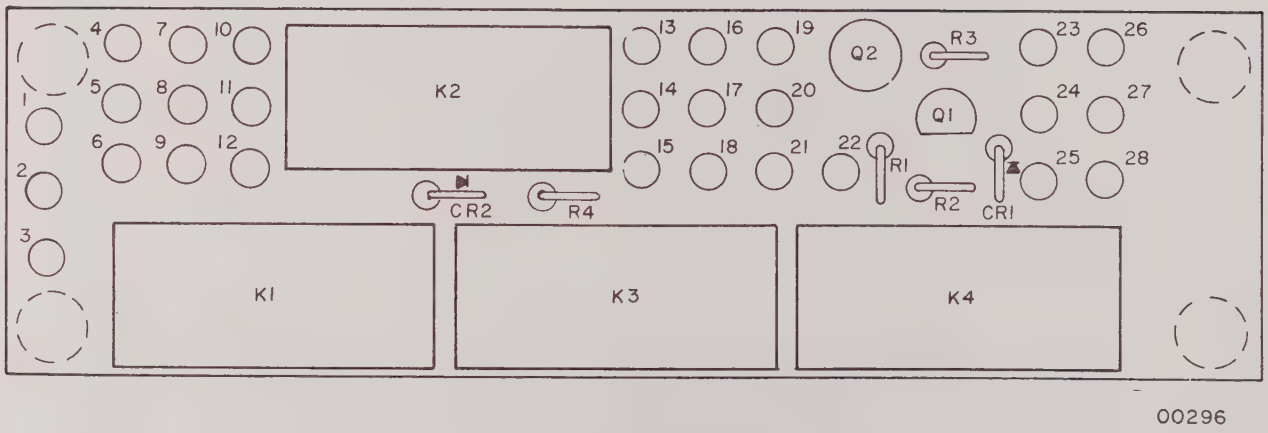


Figure 7—59. Model 8651 Relay Board Component Location Diagram

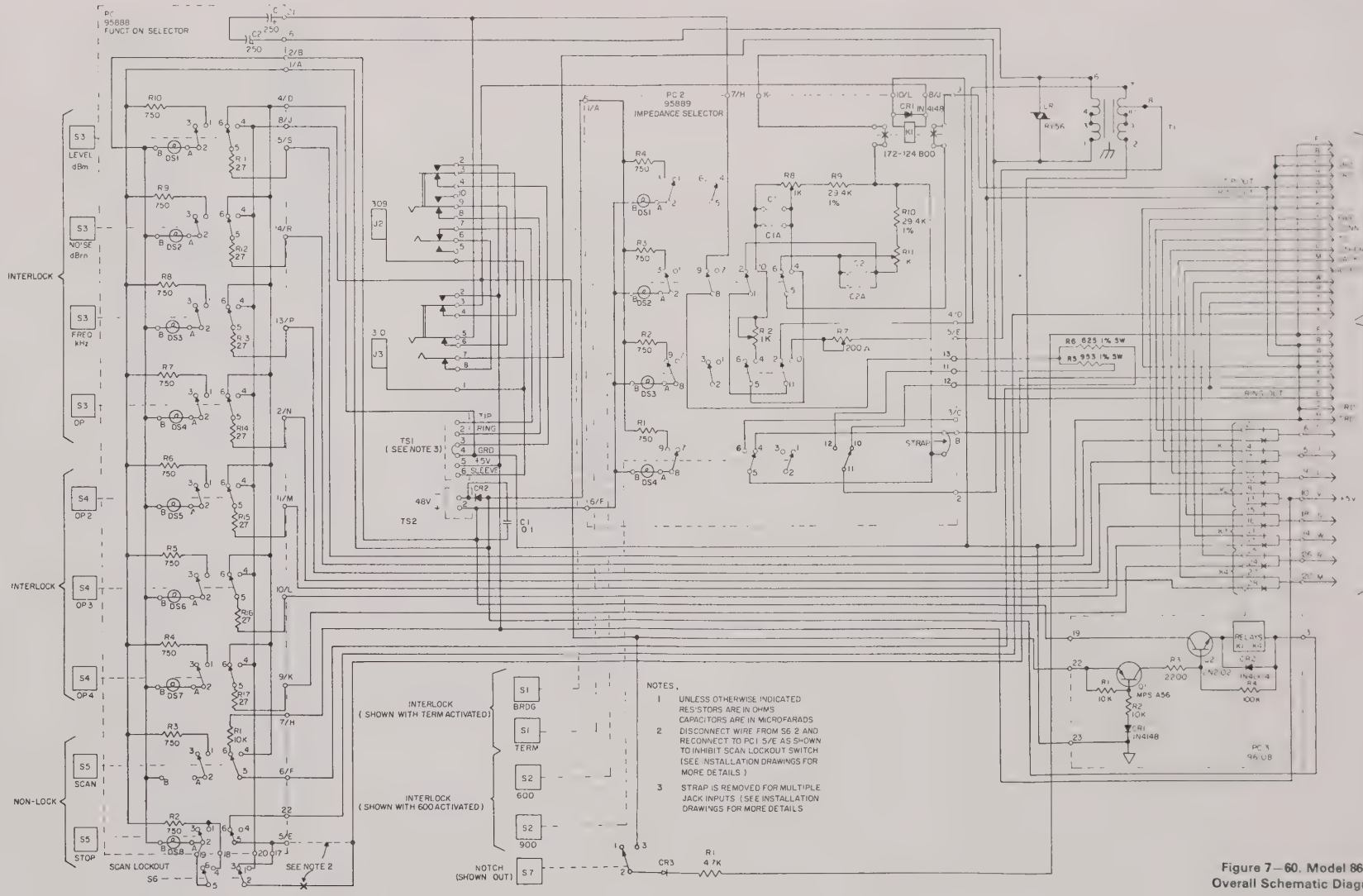


Figure 7—60. Model 8651 Overall Schematic Diagram

Table 7—1. Wire Lists (Sheet 1)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #1
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J1	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J22.3A	Tip		
E		J22.5A	Ring		
K		J22.1B	Gnd		
D		J22.14B	Meas. Level Request	1	
J		J22.15B	Meas. Noise Request	1	
L		J22.16B	Meas. Freq. Request	1	
M		J22.9A	Meas. Option #1 Request	1	
S		J22.8B	Meas. Option #2 Request	1	
W		J22.8A	Meas. Option #3 Request	1	
R		J22.9B	Meas. Option #4 Request	1	
V	J2.V		+5 VDC		
X		J22.1A	Stop Command	1	
T	J2.T	J26.B	Scan Command	0	
F	J30.5		Notch Request	1	

Table 7—1. (Sheet 2)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #2
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J2	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J22.30A	Tip		
E		J22.29A	Ring		
K		J22.1B	Gnd		
D		J22.17B	Meas. Level Request	1	
J		J22.18B	Meas. Noise Request	1	
L		J22.21B	Meas. Freq. Request	1	
M		J22.25B	Meas. Option #1 Request	1	
S		J22.24A	Meas. Option #2 Request	1	
W		J22.25A	Meas. Option #3 Request	1	
R		J22.26B	Meas. Option #4 Request	1	
V	J5.V	J1.V	+5 VDC		
X		J22.2A	Stop Command	1	
T	J5.T	J1.T	Scan Command	0	
F	J30.T		Notch Request	1	

Table 7—1. (Sheet 3)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #1
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J3	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J3.B		Ground		
B	J3.C		Ground		
C	J3.D		Ground		
D	J3.E		Ground		
E	J3.F		Ground		
F	P20.W		Ground from PWR Supply		
H	J19.A	J22.7A	XFER Pulse to Display #1A	1	
J	J3.K		+10 VDC		
K	J3.L		+10 VDC		
L	J3.M		+10 VDC		
M	J4.J		+10 VDC		
N	J4.N		+190 VDC		
P	J4.P		$\overline{A}$ Digit 1 L.S.B.		
R	J4.R		$\overline{B}$ Digit 1		
S	J4.S		$\overline{C}$ Digit 1		
T	J4.T		$\overline{D}$ Digit 1 M.S.B.		
U	J4.U		$\overline{A}$ Digit 2 L.S.B.		
V	J4.V		$\overline{B}$ Digit 2		
W	J4.W		$\overline{C}$ Digit 2		
X	J4.X		$\overline{D}$ Digit 2 M.S.B.		
Y	J4.Y		$\overline{A}$ Digit 3 L.S.B.		
Z	J4.Z		$\overline{B}$ Digit 3		
AA	J4.AA		$\overline{C}$ Digit 3		
BB	J4.BB		$\overline{D}$ Digit 3 M.S.B.		
CC	J4.CC		$\overline{A}$ Digit 4 L.S.B.		
DD	J4.DD		$\overline{B}$ Digit 4		
EE	J4.EE		$\overline{C}$ Digit 4		
FF	J4.FF		$\overline{D}$ Digit 4 M.S.B.		
HH	J4.HH		$\overline{A}$ Meas. Code L.S.B.		
JJ	J4.JJ		$\overline{B}$ Meas. Code		
KK	J4.KK		$\overline{C}$ Meas. Code		
LL	J4.LL		$\overline{D}$ Meas. Code M.S.B.		
MM	J16.n	J22.10A	Scan Lamp (Read Line)	1	
NN		J26.9	Stop Lamp	1	
PP		J4.PP	Out-Of-Range Command	1	
TT		J22.20A	Transfer Display 1B	1	

Table 7—1. (Sheet 4)

ASSEMBLY NAME	Multi-Purpose Transmission System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #2
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J4	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J4.B		Ground		
B	J4.C		Ground		
C	J4.D		Ground		
D	J4.E		Ground		
E	J4.F		Ground		
F	P20.KK		Ground From PWR Supply		
H	J19.B	J22.29B	XFER Pulse To Display #2A	1	
J	J4.K	J3.M	+10 VDC		
K	J4.L		+10 VDC		
L	J4.M		+10 VDC		
M	P20.J		+10 VDC From PWR Supply		
N	J7.N	J3.N	+190 VDC		
P	J7.P	J3.P	$\overline{A}$ Digit 1 L.S.B.		
R	J7.R	J3.R	$\overline{B}$ Digit 1		
S	J7.S	J3.S	$\overline{C}$ Digit 1		
T	J7.T	J3.T	$\overline{D}$ Digit 1 M.S.B.		
U	J7.U	J3.U	$\overline{A}$ Digit 2 L.S.B.		
V	J7.V	J3.V	$\overline{B}$ Digit 2		
W	J7.W	J3.W	$\overline{C}$ Digit 2		
X	J7.X	J3.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J7.Y	J3.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J7.Z	J3.Z	$\overline{B}$ Digit 3		
AA	J.7AA	J3.AA	$\overline{C}$ Digit 3		
BB	J7.BB	J3.BB	$\overline{D}$ Digit 3 M.S.B.		
CC	J7.CC	J3.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J7.DD	J3.DD	$\overline{B}$ Digit 4		
EE	J7.EE	J3.EE	$\overline{C}$ Digit 4		
FF	J7.FF	J3.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J7.HH	J3.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J7.JJ	J3.JJ	$\overline{B}$ Meas. Code		
KK	J7.KK	J3.KK	$\overline{C}$ Meas. Code		
LL	J7.LL	J3.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J16.p	J22.19A	Scan Lamp (Read Line)	1	
NN		J26.10	Stop Lamp	1	
PP	J3.PP	J7.PP	Out-Of-Range Command	1	
TT	J19.N	J22.5B	Transfer Display 2B	1	

Table 7—1. (Sheet 5)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #3
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J5	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J23.3A	Tip		
E		J23.5A	Ring		
K		J23.1B	Gnd		
D		J23.14B	Meas. Level Request	1	
J		J23.15B	Meas. Noise Request	1	
L		J23.16B	Meas. Freq. Request	1	
M		J23.9A	Meas. Option #1 Request	1	
S		J23.8B	Meas. Option #2 Request	1	
W		J23.8A	Meas. Option #3 Request	1	
R		J23.9B	Meas. Option #4 Request	1	
V	J6.V	J2.V	+5 VDC		
X		J23.1A	Stop Command	1	
T	J6.T	J2.T	Scan Command	0	
F	J30.11		Notch Request	1	

Table 7—1. (Sheet 6)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #4
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J6	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J23. 30A	Tip		
E		J23. 29A	Ring		
K		J23. 1B	Gnd		
D		J23. 17B	Meas. Level Request	1	
J		J23. 18B	Meas. Noise Request	1	
L		J23. 21B	Meas. Freq. Request	1	
M		J23. 25B	Meas. Option #1 Request	1	
S		J23. 24A	Meas. Option #2 Request	1	
W		J23. 25A	Meas. Option #3 Request	1	
R		J23. 26B	Meas. Option #4 Request	1	
V	J9. V	J5. V	+5 VDC		
X		J23. 2A	Stop Command		
T	J9. T	J5. T	Scan Command	0	
F	J30. 21		Notch Request	1	

Table 7—1. (Sheet 7)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #3
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J7	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J7.B		Ground		
B	J7.C		Ground		
C	J7.D		Ground		
D	J7.E		Ground		
E	J7.F		Ground		
F	P20.LL		Ground From PWR Supply		
H	J19.C	J23.7A	XFER Pulse To Display #3A	1	
J	J7.K	J18.P	+10 VDC		
K	J7.L		+10 VDC		
L	J7.M		+10 VDC		
M	J8.J		+10 VDC		
N	J8.N	J4.N	+190 VDC		
P	J8.P	J4.P	$\overline{A}$ Digit 1 L.S.B.		
R	J8.R	J4.R	$\overline{B}$ Digit 1		
S	J8.S	J4.S	$\overline{C}$ Digit 1		
T	J8.T	J4.T	$\overline{D}$ Digit 1 M.S.B.		
U	J8.U	J4.U	$\overline{A}$ Digit 2 L.S.B.		
V	J8.V	J4.V	$\overline{B}$ Digit 2		
W	J8.W	J4.W	$\overline{C}$ Digit 2		
X	J8.X	J4.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J8.Y	J4.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J8.Z	J4.Z	$\overline{B}$ Digit 3		
AA	J8.AA	J4.AA	$\overline{C}$ Digit 3		
BB	J8.BB	J4.BB	$\overline{D}$ Digit 3 M.S.B.		
CC	J8.CC	J4.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J8.DD	J4.DD	$\overline{B}$ Digit 4		
EE	J8.EE	J4.EE	$\overline{C}$ Digit 4		
FF	J8.FF	J4.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J8.HH	J4.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J8.JJ	J4.JJ	$\overline{B}$ Meas. Code		
KK	J8.KK	J4.KK	$\overline{C}$ Meas. Code		
LL	J8.LL	J4.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J16.r	J23.10A	Scan Lamp (Read Line)	1	
NN		J26.11	Stop Lamp	1	
PP	J4.PP	J8.PP	Out-Of-Range Command	1	
TT	J19LL	J23.20A	Transfer Display 3B	1	

Table 7—1. (Sheet 8)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #4
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J8	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J8.B		Ground		
B	J8.C		Ground		
C	J8.D		Ground		
D	J8.E		Ground		
E	J8.F		Ground		
F	P20.MM		Ground PWR. Supply		
H	J19.D	J23.29B	XFER Pulse To Display #4A	1	
J	J8.K	J7.M	+10 VDC		
K	J8.L		+10 VDC		
L	J8.M		+10 VDC		
M	P20.K		+10 VDC From PWR Supply		
N	J11.N	J7.N	+190 VDC		
P	J11.P	J7.P	$\overline{A}$ Digit 1 L.S.B.		
R	J11.R	J7.R	$\overline{B}$ Digit 1		
S	J11.S	J7.S	$\overline{C}$ Digit 1		
T	J11.T	J7.T	$\overline{D}$ Digit 1 M.S.B.		
U	J11.U	J7.U	$\overline{A}$ Digit 2 L.S.B.		
V	J11.V	J7.V	$\overline{B}$ Digit 2		
W	J11.W	J7.W	$\overline{C}$ Digit 2		
X	J11.X	J7.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J11.Y	J7.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J11.Z	J7.Z	$\overline{B}$ Digit 3		
AA	J11.AA	J7.AA	$\overline{C}$ Digit 3		
BB	J11.BB	J7.BB	$\overline{D}$ Digit 3 M.S.B.		
CC	J11.CC	J7.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J11.DD	J7.DD	$\overline{B}$ Digit 4		
EE	J11.EE	J7.EE	$\overline{C}$ Digit 4		
FF	J11.FF	J7.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J11.HH	J7.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J11.JJ	J7.JJ	$\overline{B}$ Meas. Code		
KK	J11.KK	J7.KK	$\overline{C}$ Meas. Code		
LL	J11.LL	J7.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J16.s	J23.19A	Scan Lamp (Read Line)	1	
NN		J26.12	Stop Lamp	1	
PP	J7.PP	J11.PP	Out-Of-Range Command	1	
TT	J19.PP	J23.5B	Transfer Display 4B	1	

Table 7—1. (Sheet 9)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #5
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J9	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J24. 3A	Tip		
E		J24. 5B	Ring		
K		J24. 1B	Gnd		
D		J24. 14B	Meas. Level Request	1	
J		J24. 15B	Meas. Noise Request	1	
L		J24. 16B	Meas. Freq. Request	1	
M		J24. 9A	Meas. Option #1 Request	1	
S		J24. 8B	Meas. Option #2 Request	1	
W		J24. 8A	Meas. Option #3 Request	1	
R		J24. 9B	Meas. Option #4 Request	1	
V	J10. V	J6. V	+5 VDC		
X		J24. 1A	Stop Command	1	
T	J10. T	J6. T	Scan Command	0	
F	J30. 13		Notch Request	1	

Table 7—1. (Sheet 10)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #6
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J10	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J24. 30A	Tip		
E		J24. 29A	Ring		
K		J24. 1B	Gnd		
D		J24. 17B	Meas. Level Request	1	
J		J24. 18B	Meas. Noise Request	1	
L		J24. 21B	Meas. Freq. Request	1	
M		J24. 25B	Meas. Option #1 Request	1	
S		J24. 24A	Meas. Option #2 Request	1	
W		J24. 25A	Meas. Option #3 Request	1	
R		J24. 26B	Meas. Option #4 Request	1	
V	J13. V	J9. V	+5 VDC		
X		J24. 2A	Stop Command	1	
T	J13. T	J9. T	Scan Command	0	
F	J30. 14		Notch Request	1	

Table 7—1. (Sheet 11)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	DATA INFORMATION TO DISPLAY #5
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J11	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J11.B		Gnd		
B	J11.C		Gnd		
C	J11.D		Gnd		
D	J11.E		Gnd		
E	J11.F		Gnd		
F	P20.NN		Gnd From PWR Supply		
H	J19.E	J24.7A	Transfer Pulse Display #5A	1	
J	J11.K		+10 VDC		
K	J11.L		+10 VDC		
L	J11.M		+10 VDC		
M	J12.J		+10 VDC		
N	J12.N	J8.N	+190 VDC		
P	J12.P	J8.P	$\overline{A}$ Digit 1 L.S.B.		
R	J12.R	J8.R	$\overline{B}$ Digit 1		
S	J12.S	J8.S	$\overline{C}$ Digit 1		
T	J12.T	J8.T	$\overline{D}$ Digit 1 M.S.B.		
U	J12.U	J8.U	$\overline{A}$ Digit 2 L.S.B.		
V	J12.V	J8.V	$\overline{B}$ Digit 2		
W	J12.W	J8.W	$\overline{C}$ Digit 2		
X	J12.X	J8.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J12.Y	J8.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J12.Z	J8.Z	$\overline{B}$ Digit 3		
AA	J12.AA	J8.AA	$\overline{C}$ Digit 3		
BB	J12.BB	J8.BB	$\overline{D}$ Digit 3 M.S.B.		
CC	J12.CC	J8.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J12.DD	J8.DD	$\overline{B}$ Digit 4		
EE	J12.EE	J8.EE	$\overline{C}$ Digit 4		
FF	J12.FF	J8.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J12.HH	J8.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J12.JJ	J8.JJ	$\overline{B}$ Meas. Code		
KK	J12.KK	J8.KK	$\overline{C}$ Meas. Code		
LL	J12.LL	J8.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J16.t	J24.10A	Scan Lamp (Read Line)	1	
NN		J26.13	Stop Lamp	1	
PP	J8.PP	J12.PP	Out-Of-Range Command	1	
TT	J19.RR	J24.20A	Transfer Display 5B	1	

Table 7—1. (Sheet 12)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	DATA INFORMATION TO DISPLAY #6
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J12	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J12.B		Gnd		
B	J12.C		Gnd		
C	J12.D		Gnd		
D	J12.E		Gnd		
E	J12.F		Gnd		
F	P20.a		Gnd From PWR Supply		
H	J19.F	J24.29B	Transfer Pulse Display #6A	1	
J	J12.K	J11.M	+10 VDC		
K	J12.L		+10 VDC		
L	J12.M		+10 VDC		
M	P20.h		+10 VDC From Supply		
N	J15.N	J11.N	+190 VDC		
P	J15.P	J11.P	$\overline{A}$ Digit 1 L.S.B.		
R	J15.R	J11.R	$\overline{B}$ Digit 1		
S	J15.S	J11.S	$\overline{C}$ Digit 1		
T	J15.T	J11.T	$\overline{D}$ Digit 1 M.S.B.		
U	J15.U	J11.U	$\overline{A}$ Digit 2 L.S.B.		
V	J15.V	J11.V	$\overline{B}$ Digit 2		
W	J15.W	J11.W	$\overline{C}$ Digit 2		
X	J15.X	J11.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J15.Y	J11.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J15.Z	J11.Z	$\overline{B}$ Digit 3		
AA	J15.AA	J11.AA	$\overline{C}$ Digit 3		
BB	J15.BB	J11.BB	$\overline{D}$ Digit 3 M.S.B.		
CC	J15.CC	J11.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J15.DD	J11.DD	$\overline{B}$ Digit 4		
EE	J15.EE	J11.EE	$\overline{C}$ Digit 4		
FF	J15.FF	J11.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J15.HH	J11.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J15.JJ	J11.JJ	$\overline{B}$ Meas. Code		
KK	J15.KK	J11.KK	$\overline{C}$ Meas. Code		
LL	J15.LL	J11.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J16.u	J24.19A	Scan Lamp (Read Line)	1	
NN		J26.7	Stop Lamp	1	
PP	J11.PP	J15.PP	Out-Of-Range Command	1	
TT	J19.SS	J24.5B	Transfer Display 6B	1	

Table 7—1. (Sheet 15)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #7
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J15	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J15.B		Gnd		
B	J15.C		Gnd		
C	J15.D		Gnd		
D	J15.E		Gnd		
E	J15.F		Gnd		
F	P20.b		Gnd From PWR. Supply		
H	J19.H	J25.7A	XFER Pulse To Display #7A	1	
J	J15.K		+10 VDC		
K	J15.L		+10 VDC		
L	J15.M		+10VDC		
M	J16.J		+10 VDC		
N	J16.N	J12.N	+190 VDC		
P	J16.P	J12.P	$\bar{A}$ Digit 1 L.S.B.		
R	J16.R	J12.R	$\bar{B}$ Digit 1		
S	J16.S	J12.S	$\bar{C}$ Digit 1		
T	J16.T	J12.T	$\bar{D}$ Digit 1 M.S.B.		
U	J16.U	J12.U	$\bar{A}$ Digit 2 L.S.B.		
V	J16.V	J12.V	$\bar{B}$ Digit 2		
W	J16.W	J12.W	$\bar{C}$ Digit 2		
X	J16.X	J12.X	$\bar{D}$ Digit 2 M.S.B.		
Y	J16.Y	J12.Y	$\bar{A}$ Digit 3 L.S.B.		
Z	J16.Z	J12.Z	$\bar{B}$ Digit 3		
AA	J16.AA	J12.AA	$\bar{C}$ Digit 3		
BB	J16.BB	J12.BB	$\bar{D}$ Digit 3 M.S.B.		
CC	J16.CC	J12.CC	$\bar{A}$ Digit 4 L.S.B.		
DD	J16.DD	J12.DD	$\bar{B}$ Digit 4		
EE	J16.EE	J12.EE	$\bar{C}$ Digit 4		
FF	J16.FF	J12.FF	$\bar{D}$ Digit 4 M.S.B.		
HH	J16.HH	J12.HH	$\bar{A}$ Meas. Code L.S.B.		
JJ	J16.JJ	J12.JJ	$\bar{B}$ Meas. Code		
KK	J16.KK	J12.KK	$\bar{C}$ Meas. Code		
LL	J16.LL	J12.LL	$\bar{D}$ Meas. Code M.S.B.		
MM	J16.v	J25.10A	Scan Lamp (Read Line)	1	
NN		J26.15	Stop Lamp	1	
PP	J12.PP	J16.a	Out-Of-Range Command	1	
TT	J19.TT	J25.20A	Transfer Data 7B	1	

Table 7—1. (Sheet 16)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Display Unit #8
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J16	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J16.B		Gnd		
B	J16.C		Gnd		
C	J16.D		Gnd		
D	J16.E		Gnd		
E	J16.F		Gnd		
F	P20.E		Gnd From PWR. Supply		
H	J19.J	J25.29B	XFER Pulse To Display #8A	1	
J	J16.K	J15.M	+10 VDC		
K	J16.L		+10 VDC		
L	J16.M		+10 VDC		
M	P20.L		+10 VDC From Supply		
N	P20.V	J15.N	+190 VDC From Supply		
P	J39.A	J15.P	$\overline{A}$ Digit 1 L.S.B.		
R	J39.E	J15.R	$\overline{B}$ Digit 1		
S	J39.4	J15.S	$\overline{C}$ Digit 1		
T	J39.6	J15.T	$\overline{D}$ Digit 1 M.S.B.		
U	J39.W	J15.U	$\overline{A}$ Digit 2 L.S.B.		
V	J39.21	J15.V	$\overline{B}$ Digit 2		
W	J39.19	J15.W	$\overline{C}$ Digit 2		
X	J39.X	J15.X	$\overline{D}$ Digit 2 M.S.B.		
Y	J39.H	J15.Y	$\overline{A}$ Digit 3 L.S.B.		
Z	J39.9	J15.Z	$\overline{B}$ Digit 3		
AA	J39.7	J15.AA	$\overline{C}$ Digit 3		
BB	J39.10	J15.BB	$\overline{D}$ Digit 3 M.S.B		
CC	J39.15	J15.CC	$\overline{A}$ Digit 4 L.S.B.		
DD	J39.U	J15.DD	$\overline{B}$ Digit 4		
EE	J39.14	J15.EE	$\overline{C}$ Digit 4		
FF	J39.17	J15.FF	$\overline{D}$ Digit 4 M.S.B.		
HH	J39.L	J15.HH	$\overline{A}$ Meas. Code L.S.B.		
JJ	J39.13	J15.JJ	$\overline{B}$ Meas. Code		
KK	J39.M	J15.KK	$\overline{C}$ Meas. Code		
LL	J39.12	J15.LL	$\overline{D}$ Meas. Code M.S.B.		
MM	J21.E	J25.19A	Scan Lamp (Read Line)	1	
NN		J26.15	Stop Lamp	1	
a	J15.PP	J19.NN	Out-Of-Range Command	1	
b		J22.26A	Transfer Data Pulse	1	
c		J19.A	Transfer Pulse Display #1	1	
d		J19.B	Transfer Pulse Display #2	1	
e		J19.C	Transfer Pulse Display #3	1	
f		J19.D	Transfer Pulse Display #4	1	
h		J19.E	Transfer Pulse Display #5	1	
j		J19.F	Transfer Pulse Display #6	1	
k		J19.H	Transfer Pulse Display #7	1	
m	J19.M	J25.5B	Transfer Display 8B	1	

Table 7—1. (Sheet 19)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	REMOTE MEASURING ACCESSORY UNIT #2
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J18	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J18.M;P20.C		Gnd Power Supply		
B		J33.8	Signal (IN)		
C		J33.J	Signal Gnd (IN)		
D	J34.P		Signal (OUT)		
L	J34.T		Signal Ground (OUT)		
M	J17.h	J18.A	Gnd		
N	P20.d		+5 VDC		
P	J7.J		+10 VDC		
DD	P20.k		+12 VDC		
EE	P20.l		-12 VDC		
FF		J33.X	$\overline{A}$ Diode Matrix Input		
HH		J33.Y	$\overline{B}$ Diode Matrix Input		
PP		J33.20	$\overline{C}$ Diode Matrix Input		
RR		J33.21	$\overline{D}$ Diode Matrix Input		
SS		J33.H	A-D Conv. (IN)		
TT	J36.H		A-D Conv. (OUT)		
V		J32.17	Tip (IN)		
W		J32.16	Ring (IN)		
X	J41.7		Tip (OUT)		
Y	J41.6		Ring (OUT)		
BB		J34.N	Log. Conv. (IN)		
CC		J35.E	Log Conv. (OUT)		

Table 7—1. (Sheet 20)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	External Recorder
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J19	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A	J16.c	J3.H	Transfer Pulse Display #1	1	
B	J16.d	J4.H	Transfer Pulse Display #2	1	
C	J16.e	J7.H	Transfer Pulse Display #3	1	
D	J16.f	J8.H	Transfer Pulse Display #4	1	
E	J16.h	J11.H	Transfer Pulse Display #5	1	
F	J16.j	J12.H	Transfer Pulse Display #6	1	
H	J16.k	J15.H	Transfer Pulse Display #7	1	
J		J16.H	Transfer Pulse Display #8	1	
K		J40.L	A Meas. Code L.S.B.		
L		J40.13	B Meas. Code		
P		J40.M	C Meas. Code		
R		J40.12	D Meas. Code M.S.B.		
S		J40.A	A Digit 1 L.S.B.		
T		J40.E	B Digit 1		
U		J40.4	C Digit 1		
V		J40.6	D Digit 1 M.S.B.		
W		J40.W	A Digit 2 L.S.B.		
X		J40.21	B Digit 2		
Y		J40.19	C Digit 2		
Z		J40.X	D Digit 2 M.S.B.		
AA		J40.H	A Digit 3 L.S.B.		
BB		J40.9	B Digit 3		
CC		J40.7	C Digit 3		
DD		J40.10	D Digit 3 M.S.B.		
EE		J40.15	A Digit 4 L.S.B.		
FF		J40.U	B Digit 4		
HH		J40.14	C Digit 4		
JJ		J40.17	D Digit 4 M.S.B.		
KK	P20.D		Power Supply Gnd		
MM	P20.e		+5 VDC Pwr Supply		
NN	J16.a	J35.13	Out-Of-Range Command	1	
M		J16.m	Transfer Display 8B	1	
N		J4.TT	Transfer Display 2B	1	
LL		J7.TT	Transfer Display 3B	1	
PP		J8.TT	Transfer Display 4B	1	
RR		J11.TT	Transfer Display 5B	1	
SS		J12.TT	Transfer Display 6B	1	
TT		J15.TT	Transfer Display 7B	1	

Table 7—1. (Sheet 21)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8620-8621
CONNECTOR FUNCTION	Power Supply (AC & DC)
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

P20	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J27.1	Pwr Gnd		
B		J33.1	Pwr Gnd		
C		J18.A	Pwr Gnd		
D		J19.KK	Pwr Gnd		
E		J16.F	Pwr Gnd		
F		J38.1	Pwr Gnd		
H		J39.1	Pwr Gnd		
J		J4.M	+10 VDC		
K		J8.M	+10 VDC		
L		J16.M	+10 VDC		
M		J27.22	+5 VDC		
N		J33.22	+5 VDC		
P		J38.22	+5 VDC		
R		J33.4	+12 VDC		
S		J36.Y	+12 VDC		
T		J33.6	-12 VDC		
U		J36.C	-12 VDC		
V		J16.N	+190 VDC		
W		J3.F	Pwr Gnd		
X		J26.22	+5 VDC		
Y		J25.31B	+5 VDC		
Z		J36.D	+190 VDC		
AA		J23.31B	+5 VDC		
BB		J21.1A	Pwr Gnd		
CC		J36.8	Pwr Gnd		
DD		J28.1	Pwr Gnd		
EE		J25.1B	Pwr Gnd		
FF		J23.1B	Pwr Gnd		
HH		J26.1	Pwr Gnd		
JJ		J39.22	+5 VDC		
KK		J4.F	Pwr Gnd		
LL		J7.F	Pwr Gnd		
MM		J8.F	Pwr Gnd		
NN		J11.F	Pwr Gnd		
a		J12.F	Pwr Gnd		
b		J15.F	Pwr Gnd		
c		J14.V	+5 VDC		
d		J18.N	+5 VDC		
e		J19.MM	+5 VDC		
f		J21.10, J21-L	+5 VDC		
h		J12.M	+10 VDC		
j		J38.Y	+12 VDC		
k		J18.DD	+12 VDC		
l		J18.EE	-12 VDC		
m		J34.1	Pwr Gnd		
n		J36.22	+5 VDC		
p		J37.22	+5 VDC		
t		J29.B	+10 VDC		

Table 7—1. (Sheet 22)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Scan Light Display Ass'y
CARD NAME AND NUMBER	Scan Light Display 95801

CONNECTOR DESIGNATION AND WIRING INFORMATION

J21	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.BB;S2.6		Power Supply Gnd		
2					
3					
4					
5					
6					
7					
8					
9					
10	S2.4;P20.f		+5 VDC Pwr Supply		
A	J21.1		Power Supply Gnd		
B		J16.p	#2 Access Served	1	
C		J16.s	#4 Access Served	1	
D		J16.u	#6 Access Served	1	
E		J16.MM	#8 Access Served	1	
F		J16.v	#7 Access Served	1	
H		J16.t	#5 Access Served	1	
J		J16.r	#3 Access Served	1	
K		J16.n	#1 Access Served	1	
L					

Table 7—1. (Sheet 23)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P. C. Connector For Line Unit #1 and #2
CARD NAME AND NUMBER	Line Unit #1 and #2 95778

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 1 J22	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1B	J23.1B, J22.4B, J1K		Gnd		
2B	J23.2B		Clocks Line Unit F.F. on scan command	0	
3B	J23.3B		Manual Clock Inhibit	0	
4B	J2.K, J22.22A	J22.1B	Gnd		
5B	J4.TT		Trnasfer Display 2B	1	
7B	J23.7B		End Meas. Request XFER Out	0	
8B	J1.S		Option 2 Command (IN)	1	Jack Access #1
9B	J1.R		Option 4 Command (IN)	1	Jack Access #1
13B	J26.3		Read Line #1	1	
14B	J1.D		Meas. Level Command (IN)	1	Jack Access #1
15B	J1.J		Meas. Noise Command (IN)	1	Jack Access #1
16B	J1.L		Meas. Freq. Command (IN)	1	Jack Access #1
17B	J2.D		Meas. Level Command (IN)	1	Jack Access #2
18B	J2.J		Meas. Noise Command (IN)	1	Jack Access #2
21B	J2.L		Meas. Freq. Command (IN)	1	Jack Access #2
24B	J26.4		Read Line #2	1	
25B	J2.M		Option 1 Command (IN)	1	Jack Access #2
26B	J2.R		Option 4 Command (IN)	1	Jack Access #2
27B	J2.D, J26.19		Line #2 Meas Request (OUT)	1	
28B	J26.20		Line #1 Meas Request (OUT)	1	
29B	J4.H		Transfer Display #2 A	0	
30B	J23.30B;S2.2		Transfer To All Displays In Stop Mode	1	
31B		J22.23A	+5 VDC Pwr Supply		
1A	J1.X		Stop Command (IN)	1	Jack Access #1
2A	J2.X		Stop Command (IN)	1	Jack Access #2
3A	J1.A		Tip (IN)		Jack Access #1
5A	J1.E		Ring (IN)		Jack Access #1
7A	J3.H		Transfer Display #1 A	0	
8A	J1.W		Option 3 Command (IN)	1	Jack Access #1
9A	J1.M		Option 1 Command (IN)	1	Jack Access #1
13A	J23.13A		Option 3 (OUT)	0	
14A	J23.14A		Option 2 (OUT)	0	
15A	J23.15A		Level (OUT)	0	
16A	J23.16A		Noise (OUT)	0	
17A	J23.17A		Freq. (OUT)	0	
18A	J23.18A		Option 4 (OUT)	0	
21A	J23.21A		Option 1 (OUT)	0	
24A	J2.S		Option 2 Command (IN)	1	Jack Access #2
25A	J2.W		Option 3 Command (IN)	1	Jack Access #2

Table 7—1. (Sheet 24)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P. C. Connector For Line Unit #1 and 2
CARD NAME AND NUMBER	Line Unit #1 and 2 95778 (cont)

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 1 J22	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
26A	J23.26A, J16.b		Transfer Data (IN)	1	
11A	J23.11A		Tip (OUT)		
12A	J23.12A		Ring (OUT)		
29A	J2.E		Ring (IN)		Jack Access #2
30A	J2.A		Tip (IN)		Jack Access #2
31A	J23.31A		Resets Line Unit F.F. And Initiates End Meas. Request Transfer Pulse	1	
20A	J3.TT		Transfer Display 1B	1	
22A		J22.4B	Gnd		
23A	J22.31B, J23.23A		+5 V		
10A	J3.MM		Read Line #1	1	
19A	J4.MM		Read Line #2	1	

Table 7—1. (Sheet 25)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P. C. Connector For Line Unit #3 and #4
CARD NAME AND NUMBER	Line Unit #3 and #4 95778

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 2 J23	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1B	J24.1B, J23.4B, P20.FF	J22.1B	Gnd		
2B	J24.2B	J22.2B	Clocks Line Unit F.F. On Scan Command	0	
3B	J24.3B	J22.3B	Manual Clock Inhibit	0	
4B	J5.K, J6.K, J23.22A	J23.1B	Gnd		
5B	J8.TT		Transfer Display 4B	1	
7B	J24.7B	J22.7B	End Meas. Request XFER OUT	0	
8B	J5.S		Option 2 Command (IN)	1	Jack Access #3
9B	J5.R		Option 4 Command (IN)	1	Jack Access #3
13B	J26.5		Read Line #3	1	
14B	J5.D		Meas. Level Command (IN)	1	Jack Access #3
15B	J5.J		Meas. Noise Command (IN)	1	Jack Access #3
16B	J5.L		Meas. Freq. Command (IN)	1	Jack Access #3
17B	J6.D		Meas. Level Command (IN)	1	Jack Access #4
18B	J6.J		Meas. Noise Command (IN)	1	Jack Access #4
21B	J6.L		Meas. Freq. Command (IN)	1	Jack Access #4
24B	J26.H		Read Line #4	1	
25B	J6.M		Option 1 Command (IN)	1	Jack Access #4
26B	J6.R		Option 4 Command (IN)	1	Jack Access #4
27B	J26.17		Line #4 Meas. Request (OUT)	1	
28B	J26.18		Line #3 Meas. Request (OUT)	1	
29B	J8.H		Transfer Display #4A	0	
30B	J24.30B	J22.30B	Transfer To All Display In Stop Mode	1	
31B	P20.AA	J23.23A	+5 VDC Pwr Supply		
1A	J5.X		Stop Command (IN)	1	Jack Access #3
2A	J6.X		Stop Command (IN)	1	Jack Access #4
3A	J5.A		Tip (IN)		Jack Access #3
5A	J5.E		Ring (IN)		Jack Access #3
7A	J7.H		Transfer Display #3A	0	
8A	J5.W		Option 3 Command (IN)	1	Jack Access #3
9A	J5.M		Option 1 Command (IN)	1	Jack Access #3
13A	J24.13A	J22.13A	Option 3 (OUT)	0	
14A	J24.14A	J22.14A	Option 2 (OUT)	0	
15A	J24.15A	J22.15A	Level (OUT)	0	
16A	J24.16A	J22.16A	Noise (OUT)	0	
17A	J24.17A	J22.17A	Freq. (OUT)	0	
18A	J24.18A	J22.18A	Option 4 (OUT)	0	
21A	J24.21A	J22.21A	Option 1 (OUT)	0	
24A	J6.S		Option 2 Command (IN)	1	Jack Access #4
25A	J6.W		Option 3 Command (IN)	1	Jack Access #4

Table 7—1. (Sheet 26)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line Unit #3 and #4
CARD NAME AND NUMBER	Line Unit #3 and #4 95778 (cont)

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 2 J23	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
26A	J24.26A	J22.26A	Transfer Data (IN)	1	
11A	J24.11A	J22.11A	Tip (OUT)		
12A	J24.12A	J22.12A	Ring (OUT)		
29A	J6.E		Ring (IN)		Jack Access #4
30A	J6.A		Tip (IN)		Jack Access #4
31A	J24.31A	J22.31A	Resets Line Unit F.F. And Initiates End Meas. Request Transfer Pulse	1	
20A	J7.TT		Transfer Display 3B	1	
22A		J23.4B	Gnd		
23A	J23.31B, J24.23A	J22.23A	+5 V		
10A	J7.MM		Read Line #3	1	
19A	J8.MM		Read Line #4	1	

Table 7—1. (Sheet 27)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line Unit #5 and #6
CARD NAME AND NUMBER	Line Unit #5 and #6 95778

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 3 J24	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1B	J25.1B, J24.4B	J23.1B	Gnd		
2B	J25.2B	J23.2B	Clocks Line Unit F.F. On Scan Command	0	
3B	J25.3B	J23.3B	Manual Clock Inhibit	0	
4B	J9.K, J10.K, J24.22A	J24.1B	Gnd		
5B	J12.TT		Transfer Display 6B	1	
7B	J25.7B	J23.7B	End Meas. Request XFER Out	0	
8B	J9.S		Option 2 Command (IN)	1	Jack Access #5
9B	J9.R		Option 4 Command (IN)	1	Jack Access #5
13B	J26.F		Read Line #5	1	
14B	J9.D		Meas. Level Command (IN)	1	Jack Access #5
15B	J9.J		Meas. Noise Command (IN)	1	Jack Access #5
16B	J9.L		Meas. Freq. Command (IN)	1	Jack Access #5
17B	J10.D		Meas. Level Command (IN)	1	Jack Access #6
18B	J10.J		Meas. Noise Command (IN)	1	Jack Access #6
21B	J10.L		Meas. Freq. Command (IN)	1	Jack Access #6
24B	J26.E		Read Line #6	1	
25B	J10.M		Option 1 Command (IN)	1	Jack Access #6
26B	J10.R		Option 4 Command (IN)	1	Jack Access #6
27B	J26.U		Line #6 Meas. Request (OUT)	1	
28B	J26.T		Line #5 Meas. Request (OUT)	1	
29B	J12.H		Transfer Display #6A	0	
30B	J25.30B	J23.30B	Transfer To All Displays In Stop Mode	1	
31B		J24.23A	+5 VDC Pwr Supply		
1A	J9.X		Stop Command (IN)	1	Jack Access #5
2A	J10.X		Stop Command (IN)	1	Jack Access #6
3A	J9.A		Tip (IN)		Jack Access #5
5A	J9.E		Ring (IN)		Jack Access #5
7A	J11.H		Transfer Display #5A	0	
8A	J9.W		Option 3 Command (IN)	1	Jack Access #5
9A	J9.M		Option 1 Command (IN)	1	Jack Access #5
13A	J25.13A	J23.13A	Option 3 Command (OUT)	0	
14A	J25.14A	J23.14A	Option 2 Command (OUT)	0	
15A	J25.15A	J23.15A	Level (OUT)	0	
16A	J25.16A	J23.16A	Noise (OUT)	0	
17A	J25.17A	J23.17A	Freq. (OUT)	0	
18A	J25.18A	J23.18A	Option 4 (OUT)	0	
21A	J25.21A	J23.21A	Option 1 (OUT)	0	

Table 7—1. (Sheet 28)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line Unit #5 and #6
CARD NAME AND NUMBER	Line Unit #5 and #6 95778 (cont)

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 3 J24	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
24A	J10.S		Option 2 Command (IN)	1	Jack Access #6
25A	J10.W		Option 3 Command (IN)	1	Jack Access #6
26A	J25.26A	J23.26A	Transfer Data (IN)	1	
11A	J25.11A	J23.11A	Tip (OUT)		
12A	J25.12A	J23.12A	Ring (OUT)		
29A	J10.E		Ring (IN)		Jack Access #6
30A	J10.A		Tip (IN)		Jack Access #6
31A	J25.31A	J23.31A	Request Line Unit F.F. And Initiates End Meas, Request Transfer Pulse		
20A	J11.TT		Transfer Display 5B	1	
22A		J24.4B	Gnd		
23A	J24.31B, J25.23A	J23.23A	+5 V		
10A	J11.MM		Read Line #5	1	
19A	J12.MM		Read Line #6	1	

Table 7—1. (Sheet 29)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line #7 and #8
CARD NAME AND NUMBER	Line Unit #7 and #8

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 4 J25	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1B	J27.1;P20.EE; J25.4B	J24.1B	Gnd		
2B	J26.A	J24.2B	Clocks Line Unit F.F. On Scan Command	0	
3B	J26.Z	J24.3B	Manual Clock Inhibit	0	
4B	J13.K;J14.K; J25.22A	J25.1B	Gnd		
5B	J16.m		Transfer Display 8B	1	
7B	J26.R	J24.7B	End Meas. Request XFER Out	0	
8B	J13.S		Option 2 Command (IN)	1	Jack Access #7
9B	J13.R		Option 4 Command (IN)	1	Jack Access #7
13B	J26.J		Read Line #7	1	
14B	J13.D		Meas. Level Command (IN)	1	Jack Access #7
15B	J13.J		Meas. Noise Command (IN)	1	Jack Access #7
16B	J13.L		Meas. Freq. Command (IN)	1	Jack Access #7
17B	J14.D		Meas. Level Command (IN)	1	Jack Access #8
18B	J14.J		Meas. Noise Command (IN)	1	Jack Access #8
21B	J14.L		Meas. Freq. Command (IN)	1	Jack Access #8
24B	J26.K		Read Line #8	1	
25B	J14.M		Option 1 Command (IN)	1	Jack Access #8
26B	J14.R		Option 4 Command (IN)	1	Jack Access #8
27B	J26.W		Line #8 Meas. Request (OUT)	1	
28B	J26.V		Line #7 Meas. Request (OUT)	1	
29B	J16.H		Transfer Display #8A	0	
30B		J24.30B	Transfer To All Displays In Stop Mode	1	
31B	P20.Y	J25.23A	+5 VDC Pwr Supply		
1A	J13.X		Stop Command (IN)	1	Jack Access #7
2A	J14.X		Stop Command (IN)	1	Jack Access #8
3A	J13.A		Tip (IN)		Jack Access #7
5A	J13.E		Ring (IN)		Jack Access #7
7A	J15.H		Transfer Display #7A	0	
8A	J13.W		Option 3 Command (IN)	1	Jack Access #7
9A	J13.M		Option 1 Command (IN)	1	Jack Access #7
13A	J28.U	J24.13A	Option 3 Command (OUT)	0	
14A	J28.T	J24.14A	Option 2 Command (OUT)	0	
15A	J28.L	J24.15A	Level Command (OUT)	0	
16A	J28.N	J24.16A	Noise Command (OUT)	0	
17A	J28.R	J24.17A	Freq. Command (OUT)	0	
18A	J28.V	J24.18A	Option 4 Command (OUT)	0	
21A	J28.S	J24.21A	Option 1 Command (OUT)	0	
24A	J14.S		Option 2 Command (IN)	1	Jack Access #8
25A	J14.W		Option 3 Command (IN)	1	Jack Access #8

Table 7—1. (Sheet 30)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line Unit #7 and #8
CARD NAME AND NUMBER	Line Unit #7 and #8 (cont)

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 4 J25	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
26A	J26.Y	J24.26A	Transfer Data (IN)	1	
11A	J29.18	J24.11A	Tip (OUT)		
12A	J29.19	J24.12A	Ring (OUT)		
29A	J14.E		Ring (IN)		Jack Access #8
30A	J14.A		Tip (IN)		Jack Access #8
31A	J26.L	J24.31A	Resets Line Unit F.F. And Initiates End Meas. Request Transfer Pulse	1	
20A	J15.TT		Transfer Display 7B	1	
22A		J25.4B	Gnd		
23A	J25.31B	J24.23A			
10A	J15.MM		Read Line #7	1	
19A	J16.MM		Read Line #8	1	

Table 7—1. (Sheet 31)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Scanner
CARD NAME AND NUMBER	Scanner 95773

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 5 J26	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.HH;J27.1		Ground From Pwr Supply		
2					
3		J22.13B	Read Line #1	1	
4		J22.24B	Read Line #2	1	
5		J23.13B	Read Line #3	1	
6	J27.3		Reset Pulse Input to ÷ 12 Counter	1	
7	J26.9;J27.21	J12.NN	Stop Lamp Driver Output	1	
8	J26.M				
9	J26.10	J3.NN;J26.7	Stop Lamp Driver Output	1	
10	J26.11	J4.NN;J26.9	Stop Lamp Driver Output	1	
11	J26.12	J7.NN;J26.10	Stop Lamp Driver Output	1	
12	J26.13	J8.NN;J26.11	Stop Lamp Driver Output	1	
13	J26.15	J11.NN;J26.12	Stop Lamp Driver Output	1	
14					
15	J16.NN	J15.NN;J26.13	Stop Lamp Driver Output	1	
16	S2.5		Manual Clock Inhibit	0	
17		J23.27B	Line #4 Meas Request (IN)	1	
18		J23.28B	Line #3 Meas Request (IN)	1	
19		J22.27B	Line #2 Meas Request (IN)	1	
20		J22.28B	Line #1 Meas Request (IN)	1	
21	S2.3		Enables Line Transfer Gates On Stop Command	1	
22	P20.X	J26.M	+5 VDC		
A		J25.2B			
B	J1.T;S4.6		Scan Command (IN)	0	
C	S3.4		Manual Line Selection (IN)		
D	S3.1		Manual Line Selection (IN)		
E		J24.24B	Read Line #6	1	
F		J24.13B	Read Line #5	1	
H		J23.24B	Read Line #4	1	
J		J25.13B	Read Line #7	1	
K		J25.24B	Read Line #8	1	
L		J25.31A	Resets All Line Unit F.F. Initiates End Meas. Trsfer Pulse		
M	J26.22	J26.8	+5 VDC (IN)		
N	J38.2		.1 SEC.,5 HZ TO ÷ 12		
P					
R	J36.W	J25.7B	Transfer IN	0	
S	J30.9		Delay Meas Cycle	0	
T		J24.28B	Line #5 Meas Request (IN)	1	
U		J24.27B	Line #6 Meas Request (IN)	1	
V		J25.28B	Line #7 Meas Request (IN)	1	
W		J25.27B	Line #8 Meas Request (IN)	1	
X	J28.A		Stop	1	
Y	J27.16	J25.26A	Transfer Data (OUT)	1	
Z		J25.3B	Stop Command Clock Inhibit	0	

Table 7—1. (Sheet 32)

ASSEMBLY NAME	Multi-Purpose Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Function Control
CARD NAME AND NUMBER	Function Control 95774

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 6 J27	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.A	J25.1;J26.1	Power Ground		
2	J29.2,J29.1		Ground		
3		J26.6	Reset Pulse Output; To ÷ 12 Counter	1	
4	J37.14		Reset Pulse Input; To ÷ 12 Counter	1	
5					
6	J28.10		Level	0	
7	J27.8	J27.22			
8	J27.9	J27.7			
9	J28.11	J27.8	Option #1 (Lvl Gate Input)	0	
10					
11		J17.F	Data Block (Meas Code)		
12		J39.N	$\bar{C}$ Meas Code		
13		J39.R	$\bar{B}$ Meas Code		
14	J35.V		Enables Meas. Noise Gates Log Conv. (OUT)	1	
15	J35.X		Enables Meas. Level Gate Log Conv. (OUT)	1	
16	J28.19	J26.Y	Transfer Data Pulse	1	
17					
18					
19					
20	J36.N		Meas. Level; Fast Digitizing; A-D Conv. (OUT)	1	
21	J30.A	J26.7	Activates 10 MS Delay Mond. On Stop Command	1	
22	P20.M		+5 VDC		
A					
B					
C	J37.N		Data Reset Pulse (OUT)	1	
D	J37.13		Delayed Start Meas. Cycle	0	
E	J36.F		+ (IN)	1	
				0	
F	J27.H	J27.22			
H	J27.J	J27.F			
J	J28.13	J27.H	Option (Noise Gate Input)	0	
K	J28.12		Noise	0	
L	J28.X		$\bar{A}$ Diode Matrix Input	0	
M	J28.Y		$\bar{B}$ Diode Matrix Input	0	
N	J28.21		$\bar{D}$ Diode Matrix Input	0	
P		J39.P	$\bar{D}$ Meas. Code		
R		J39.11	$\bar{A}$ Meas. Code		

Table 7—1. (Sheet 33)

ASSEMBLY NAME	Multi-Purpose Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Function Control
CARD NAME AND NUMBER	Function Control 95774

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 6 J27	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
S	J28.20		$\overline{C}$ Diode Matrix Input	0	
T	J28.14		Meas. Freq. Gate Input	0	
U	J37.J		DP1 (IN)	1	
V	J37.6		DP2 (IN)	1	
W	J37.D		DP3 (IN)	1	
X	J37.C		Meas. Freq. (OUT)	0	
Y	J36.K;J37.X		Meas. Level/Noise (OUT)	1	
Z	J39.B		Enables Buffer Gate On Meas. Lvl/Noise (OUT)	1	

Table 7—1. (Sheet 34)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For IMP. CONV. AMP & C- Message Filter
CARD NAME AND NUMBER	95897

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 7 J28	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.DD;J34.1		Power Ground		
2	J28.K		Ground		
3	J30.8		Analog Sig		
4	J29.4		+12 VDC		
5	J29.7		Start Meas. Cycle	0	
6	J29.6		-12 VDC		
7	J30.D		Delayed Meas Command	0	
8	J29.3		AC Signal Out		
9	J28.R		Meas. Freq. (Response 20 kHz)	1	
10	J29.10	J27.6	Meas. Level (Gate Input)	0	
11	J29.11	J27.9	Meas. Option 1 (Lvl Gate Input)	0	
12	J29.12	J27.K	Meas. Noise (Gate Input)	0	
13	J29.13	J27.J	Meas Option (Noise Gate Input)	0	
14	J29.14	J27.T	Meas. Freq. (Gate Input)	0	
15	J28.22		+5 VDC		
16					
17					
18					
19	J29.W	J27.16			
20	J29.20	J27.S	$\overline{C}$ Diode Matrix Input	0	
21	J29.21	J27.N	$\overline{D}$ Diode Matrix Input	0	
22	J29.22	J28.15	+5 VDC		
A		J26.X	Stop	1	
B	J34.8		Stop/Noise Meas. (OUT)	1	
C					
D					
E	J35.K		A-D Conv. (IN)		
F	J31.F		Meas. Noise 15 KHZ		
H	J29.E		A-D Conv. (OUT)		
J	J29.C		Signal Ground (OUT)		
K	J34.10	J28.2	Meas. Level (Response 20 kHz)	1	
L	J29.L	J25.15A	Level	0	
M	J29.M		Buss		
N	J29.N	J25.16A	Noise	0	
P	J29.P		Optional; 20 kHz Response Over-ride	0	
R	J29.R	J25.17A, J28.9	Freq.	0	
S	J29.S	J25.21A	Option 1	0	
T	J29.T	J25.14A	Option 2	0	
U	J29.U	J25.13A	Option 3	0	
V	J29.V	J25.18A	Option 4	0	
W	J33.16		Input Level Overload Clamp (IN)	1	
X	J29.X	J27.L	$\overline{A}$ Diode Matrix Input	0	
Y	J29.Y	J27.M	$\overline{B}$ Diode Matrix Input	0	
Z					

Table 7—1. (Sheet 35)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector Option P.C. Board
CARD NAME AND NUMBER	(Blank Card 95786) (AC Volts - 96022) (% Break)

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 8 J29	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J30.1	J27.1	Gnd		
2	J30.2	J27.2	Gnd		
3		J28.8	Analog Signal (IN)		
4	J30.4	J28.4	+12 VDC		
5	J31.7		Start Meas Cycle (OUT)	0	
6	J30.6	J28.6	-12 VDC		
7		J28.5	Start Meas Cycle (IN)	0	
8	J31.3		Analog Signal (OUT)		
9	J33.17		Dump Command	0	
10	J30.10	J28.10	Level (Gate Input)	0	
11	J30.11	J28.11	Option 1 (Lvl Gate Input)	0	
12	J30.12	J28.12	Noise (Gate Input)	0	
13	J30.13	J28.13	Option (Noise Gate Input)	0	
14	J30.14	J28.14	Freq (Gate Input)	0	
15	J30.15		Option Out Of Range	1	
16	J30.19		Ring (OUT)		
17	J30.18		Tip (OUT)		
18		J25.11A	Tip (IN)		
19		J25.12A	Ring (IN)		
20	J30.20	J28.20	$\overline{C}$ Diode Matrix Input	0	
21	J30.21	J28.21	$\overline{D}$ Diode Matrix Input	0	
22	J30.22	J28.22	+5 VDC		
A					
B	P20.t				
C		J28.J	Signal Gnd (IN)		
D					
E		J28.H	A-D Conv. (IN)		
F	J30.B		Stop	0	
H	J30.E		A-D Conv. (OUT)		
J	J30.C		Signal Gnd (OUT)		
K	J36.2		A-D Signal Common (OUT)		
L	J30.L	J28.L	Level	0	
M	J30.M	J28.M	Buss		
N	J30.N	J28.N	Noise	0	
P	J30.P	J28.P	Buss Optional; 30 kHz Response Override	0	
R	J30.R	J28.R	Freq	0	
S	J30.S	J28.S	Option 1	0	
T	J30.T	J28.T	Option 2	0	
U	J30.U	J28.U	Option 3	0	
V	J30.V	J28.V	Option 4	0	
W	J30.W	J28.19	Buss		
X	J30.X	J28.X	$\overline{A}$ Diode Matrix Input	0	
Y	J30.Y	J28.Y	$\overline{B}$ Diode Matrix Input	0	
Z	J37.16		A-D Inhibit (OUT)	0	

Table 7—1. (Sheet 36)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Measure Delay & C-Notch Board
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 9 J30	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J29.1	J31.1	Gnd		
2	J29.2	J31.2	Gnd		
3	T1.7		Analog Sig. (IN)		
4	J29.4	J31.4	+12V		
5	J1.F		Notch Req. #1	1	
6	J29.6	J31.6	-12V		
7	J2.F		Notch Req. #2	1	
8		J28.3	Analog Sig. (OUT)		
9	J26.S		Meas. Command	0	
10	J29.10	J31.10	Level	0	
11	J5.F		Notch Req. #3	1	
12	J29.12	J31.12	Noise	0	
13	J9.F		Notch Req. #5	1	
14	J10.F		Notch Req. #6	1	
15	J13.F		Notch Req. #7	1	
16		J31.19	Ring (OUT)		
17		J31.18	Tip (OUT)		
18	J29.17		Tip (IN)		
19	J29.16		Ring (IN)		
20	J14.F		Notch Req. #8	1	
21	J6.F		Notch Req. #4	1	
22	J29.22	J31.22	+5V		
A	J27.21	J33.B	Stop	1	
			Stop	0	
B	J29.F				
C	J29.J	T1.12	Signal Gnd (IN)		
D	J28.7		Delayed Meas. Com.	1	
E	J29.H		A-D Conv. (IN)		
F					
H		J31.E	A-D Conv. (OUT)		
J		J31.C	Signal Gnd (OUT)		
K			Analog Sig. (OUT)		
L	J29.L	J31.L	Level	0	
M	J26.3		Read Line #1	1	
N	J29.N	J31.N	Noise	0	
P	J26.5		Read Line #3	1	
R					
S	J26.F		Read Line #5	1	
T	J29.T	J31.T	Opt 3 kHz	0	

Table 7—1. (Sheet 37)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Measure Delay & C-Notch Board (cont
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card J30	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
U	J29.U	J31.U	Opt 15 kHz	0	
V	J26.E		Read Line #6	1	
W	J26.J		Read Line #7	1	
X	J26.K		Read Line #8	1	
Y	J26.4		Read Line #2	1	
Z	J26.H		Read Line #4	1	

Table 7—1. (Sheet 38)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector Option P.C. Board
CARD NAME AND NUMBER	(Blank Card 95786) or Option #4,5 or 7

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 10 J31	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J32.1	J30.1	Gnd		
2	J32.2	J30.2	Gnd		
3		J29.8	Analog Signal (IN)		
4	J32.4	J30.4	+12 VDC		
5	J32.7		Start Meas Cycle	0	
6	J32.6	J30.6	-12 VDC		
7		J29.5	Start Meas Cycle	0	
8	J32.3		Analog Signal (OUT)		
9					
10	J32.10	J30.10	Level (Gate Input)	0	
11	J32.11	J30.11	Option 1 (Lvl Gate Input)	0	
12	J32.12	J30.12	Noise (Gate Input)	0	
13	J32.13	J30.13	Option (Noise Gate Input)	0	
14	J32.14	J30.14	Freq. (Gate Input)	0	
15	J32.15	J30.15	Option Out-Of-Range	1	
16	J32.19		Ring (OUT)		
17	J32.18		Tip (OUT)	1	
18		J30.17	Tip (IN)		
19		J30.16	Ring (IN)		
20	J32.20	J30.20	$\overline{C}$ Diode Matrix Input	0	
21	J32.21	J30.21	$\overline{D}$ Diode Matrix Input	0	
22	J32.22	J30.22	+5 VDC		
A					
B					
C		J30.J	Signal Gnd (IN)		
D					
E		J30.H	A-D Conv. (IN)		
F	J32.F	J28.F	Meas. Noise 15KHz		
H	J32.E		A-D Conv. (OUT)		
J	J32.C		Signal Gnd (OUT)		
K					
L	J32.L	J30.L	Level	0	
M	J32.M	J30.M	Buss		
N	J32.N	J30.N	Noise	0	
P	J32.P	J30.P	Buss; Optional: 20 KHZ Response Override	0	
R	J32.R	J30.R	Freq.	0	
S	J32.S	J30.S	Option 1	0	
T	J32.T	J30.T	Option 2	0	
U	J32.U	J30.U	Option 3	0	
V	J32.V	J30.V	Option 4	0	
W	J32.W	J30.W	Buss		
X	J32.X	J30.X	$\overline{A}$ Diode Matrix Input	0	
Y	J32.Y	J30.Y	$\overline{B}$ Diode Matrix Input	0	
Z					

Table 7—1. (Sheet 40)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Ranging Signal Det. & Logic
CARD NAME AND NUMBER	Ranging Signal Det. And Logic 95998

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 12 J33	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.B;J33.K J35.1	J32.1	Gnd		
2	J35.2	J32.2	Gnd		
3		J32.8	Analog Signal (IN)		
4	P20.R	J32.4	+12 VDC Pwr Supply		
5	J17.J		Start Meas Cycle		
6	P20.T	J32.6	-12 VDC Pwr Supply		
7		J32.5	Start Meas Cycle	0	
8	J18.B		Signal Out		
9	J35.W;J34.M		Meas-Noise-Lvl Auto-Range-Low (OUT)	1	
10	J17.A	J32.10	Level (Gate Input)	0	
11	J17.B	J32.11	Option 1 (lvl Gate Input)	0	
12	J17.C	J32.12	Noise (Gate Input)	0	
13	J17.D	J32.13	Option (Noise-Gate Input)	0	
14	J17.E	J32.14	Freq (Gate Input)	0	
15	J35.12		Out-Of-Range Output	1	
16		J28.W	Input Lvl Over-Load Clamp (OUT)	1	
17	J34.E	J29.9	Start Of Meas. Dump Command (OUT)	0	
18			Signal Common		
19	J34.U		Ranging Dump Command (IN)	1	
20	J18.PP	J32.20	$\overline{C}$ Diode Matrix Input	0	
21	J18.RR	J32.21	$\overline{D}$ Diode Matrix Input	0	
22	P20.N	J32.22	+5 VDC Pwr Supply		
A	J34.N		DC Sig. To Out-Of-Range Det (IN)		
B		J30.A	Inhibit Dumping Circuit On Stop Command	1	
C		J32.J	Signal Gnd (IN)		
D		J37.N	Scan Mode Dump Command (IN)	0	
E		J32.H	A-D Conv. (IN)		
F	J35.U		Meas-Noise-Auto-Range-Hi (OUT)	1	
H	J18.SS		A-D Conv. (OUT)		
J	J18.C		Signal Gnd (OUT)		
K		J33.1	Gnd		
L	J17.L	J32.L	Level	0	
M	J38.K	J32.M	Buss		
N	J17.M	J32.N	Noise	0	
P	J34.S	J32.P	Buss; Optional; 20KHZ Response Override	0	
R	J17.N	J32.R	Freq	0	
S	J17.P	J32.S	Option 1	0	
T	J17.R	J32.T	Option 2	0	
U	J17.S	J32.U	Option 3	0	
V	J17.T	J32.V	Option 4	0	
W		J32.W	Buss		
X	J18.FF	J32.X	$\overline{A}$ Diode Matrix Input	0	
Y	J18.HH	J32.Y	$\overline{B}$ Diode Matrix Input	0	
Z	J34.X		AC Signal To Peak Det (IN)		

Table 7—1. (Sheet 41)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For AC-DC Converter
CARD NAME AND NUMBER	AC-DC Converter 95788

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 13 J34	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.m;J34.2	J28.1	Gnd Power Supply		
2	J35.D;J34.4	J34.1	Gnd		
3					
4		J34.2	Gnd		
5					
6					
7					
8		J28.B	Stop/Noise Meas.	1	
9					
10		J28.K	Meas. Level Response 20 kHz (IN)	1	
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22	J35.22		+5 VDC		
A					
B					
C	J35.C		-12 VDC		
D	J37.V		Meas. Freq. Input Sig (OUT)		
E		J33.17	Start Of Meas. Dump Command (IN)	0	
F					
H					
J					
K		J36.J	Meas Noise	(1)	
L					
M		J33.9			
N	J18.BB	J33.A	D C Signal (OUT)		
P		J18.D	Signal (IN)		
R					
S		J33.P	Buss-Optional: 20 kHz Response Override	0	
T		J18.L	Signal Gnd (IN)		
U		J33.19	Ranging Dump Command (OUT)	1	
V					
W					
X		J33.Z	AC Signal To Peak Det (OUT)		
Y	J35.Y		+12 VDC		
Z					

Table 7—1. (Sheet 13)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #7
CARD NAME AND NUMBER	N/A

CONNECTOR DESIGNATION AND WIRING INFORMATION

J13	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J25. 3A	Tip		
E		J25. 5A	Ring		
K		J25. 1B	Gnd		
D		J25. 14B	Meas. Level Request	1	
J		J25. 15B	Meas. Noise Request	1	
L		J25. 16B	Meas. Freq. Request	1	
M		J25. 9A	Meas. Option #1 Request	1	
S		J25. 8B	Meas. Option #2 Request	1	
W		J25. 8A	Meas. Option #3 Request	1	
R		J25. 9B	Meas. Option #4 Request	1	
V	J14. V	J10. V	+5 VDC		
X		J25. 1A	Stop Command	1	
T	J14. T	J10. T	Scan Command	0	
F	J30. 15		Notch Request	1	

Table 7—1. (Sheet 14)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Tip-Ring and Meas. Request Lines For Access #8
CARD NAME AND NUMBER	

CONNECTOR DESIGNATION AND WIRING INFORMATION

J14	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
A		J25.30A	Tip		
E		J25.29A	Ring		
K		J25.1B	Gnd		
D		J25.17B	Meas. Level Request	1	
J		J25.18B	Meas. Noise Request	1	
L		J25.21B	Meas. Freq. Request	1	
M		J25.25B	Meas. Option #1 Request	1	
S		J25.24A	Meas. Option #2 Request	1	
W		J25.25A	Meas. Option #3 Request	1	
R		J25.26B	Meas. Option #4 Request	1	
V	P20.c	J13.V	+5 VDC		
X		J25.2A	Stop Command	1	
T		J13.T	Scan Command	0	
F	J30.20		Notch Request	1	

Table 7—1. (Sheet 42)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Log Converter
CARD NAME AND NUMBER	Log Converter 95789

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 14 J35	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J36.1	J33.1	Gnd		
2	J36.2	J33.2	Gnd		
3					
4					
5					
6					
7					
8					
9					
10	J17.NN	J32.15	Ext. Meas. Out-Of-Range	1	
11	J17.a		Ext. Meas. Out-Of-Range	1	
12		J33.15	Out-Of-Range Signal (IN)	1	
13	J19.NN		Out-Of-Range Command (OUT)	1	
14					
15					
16					
17					
18					
19					
20					
21					
22	J36.22	J34.22	+5 VDC		
A					
B					
C	J36.C	J34.C	-12 VDC		
D	J36.8	J34.2	Signal Gnd (IN)		
E		J18.CC	DC Signal (IN)		
F					
H					
J					
K		J28.E	Analog Signal (OUT)		
L					
M					
N					
P					
R					
S					
T					
U		J33.F	Meas. Noise-Auto-Range Hi (IN)	1	
V		J27.14	Enables Meas. Noise Gates (IN)	1	
W		J33.9	Meas. Noise-Lvl Auto-Range (LO) (IN)	1	
X		J27.15	Enables Meas. Lvl Gate (IN)	1	
Y	J36.Y	J34.Y	+12 VDC		

Table 7—1. (Sheet 43)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P. C. Connector For A-D Converter
CARD NAME AND NUMBER	A-D Converter 95776

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 15 J36	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J37.1	J35.1	Gnd		
2	J37.2	J35.2;J29.K	A-D Signal Common (IN)		
3					
4					
5					
6					
7					
8	P20.CC	J35.D	Gnd		
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22	P20.n	J35.22	+5 VDC		
A					
B					
C	P20.U	J35.C	-12 VDC Pwr Supply		
D	P20.Z		+215 VDC Pwr Supply		
E					
F		J27.E	(+) Hi - (-) Lo (OUT)		
H		J18.TT	A-D Conv (IN) Analog Signal		
J	J34.K		Meas. Noise		
K		J27.Y	Meas. Lvl/Noise (IN)	1	
L					
M					
N		J27.20	Meas. Level; Fast Digitizing; A-D Conv. (OUT)	1	
P					
R					
S	J37.P		10^4 Spillover (IN)	1	
T	J37.15		100 kHz Clock Inhibit	0	
U					
V					
W	J37.Y	J26.K	Transfer Command	0	
X	J37.7		250 kHz Clock Inhibit	0	
Y	P20.S	J35.Y	+12V	0	
Z					

Table 7—1. (Sheet 43)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For A-D Converter
CARD NAME AND NUMBER	A-D Converter 95776

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 15 J36	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J37.1	J35.1	Gnd		
2	J37.2	J35.2;J29.K	A-D Signal Common (IN)		
3					
4					
5					
6					
7					
8	P20.CC	J35.D	Gnd		
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22	P20.n	J35.22	+5 VDC		
A					
B					
C	P20.U	J35.C	-12 VDC Pwr Supply		
D	P20.Z		+215 VDC Pwr Supply		
E					
F		J27.E	(+) Hi - (-) Lo (OUT)		
H		J18.TT	A-D Conv (IN) Analog Signal		
J	J34.K		Meas. Noise		
K		J27.Y	Meas. Lvl/Noise (IN)	1	
L					
M					
N		J27.20	Meas. Level; Fast Digitizing; A-D Conv. (OUT)	1	
P					
R					
S	J37.P		10^4Spillover (IN)	1	
T	J37.15		100 kHz Clock Inhibit	0	
U					
V					
W	J37.Y	J26.K	Transfer Command	0	
X	J37.7		250 kHz Clock Inhibit	0	
Y	P20.S	J35.Y	+12V	0	
Z					

Table 7—1. (Sheet 44)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Counter
CARD NAME AND NUMBER	Counter 95772

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 16 J37	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J38.1	J36.1	Gnd		
2		J36.2	Gnd		
3	J38.R		C Digit 1		
4	J38.D		B Digit 1		
5	J38.T		D Digit 1 M.S.B.		
6		J27.V	DP2 (OUT)	1	
7		J36.X	250 kHz Clock Inhibit		
8	J38.Z		250 kHz Clock (IN)		
9	J38.L		C Digit 2		
10	J38.J		B Digit 2		
11	J38.N		D Digit 2 M.S.B.		
12	J38.F		A Digit 2 L.S.B.		
13	J17.K	J27.D	Delayed Meas Command	1	
14		J27.4	Reset Pulse Output; To ÷12 Counter	0	
15		J36.T	100KHZ Clock(Inhibit)		
16		J29.Z	Counter Inhibit	0	
17	J38.15		C Digit 3		
18	J38.6		B Digit 3		
19	J38.17		D Digit 3 M.S.B.		
20	J38.4		A Digit 3 L.S.B.		
21	J38.13		D Digit 4 M.S.B.		
22	P20.p	J37.M	+5 VDC Pwr Supply		
A					
B					
C	J39.2	J27.X	Meas Freq Command (IN)	0	
D		J27.W	DP3 (OUT)	1	
E	J38.19		.01 Sec; 50 Hz (IN)		
F	J38.21		.001 Sec.; 500 Hz (IN)		
H	J38.V		1 Sec.; 0.5 Hz (IN)		
J		J27.U	DP1 (OUT)	1	
K	J38.B		A Digit 1 L.S.B.		
L	J38.W		.1 Sec.; 5 Hz (IN)		
M	J37.22		+5 VDC		
N	J33.D	J27.C	Data Reset Pulse (IN)	0	
P		J36.S	10^4 Spillover (OUT)	1	
R	J38.20		Reset (OUT)	1	
S	J38.11		C Digit 4		
T	J38.10		B Digit 4		
U	J38.8		A Digit 4 L.S.B.		
V		J34.D	Meas. Freq. Input Sig. (IN)		
W	J38.X		100 kHz Clock (IN)		
X		J27.Y	Enables Meas. Lvl/Noise Gate (IN)	1	
Y	J17.H	J36.W	Frequency Transfer Pulse	0	
Z					

Table 7—1. (Sheet 45)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Time Base
CARD NAME AND NUMBER	Time Base 95780

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 17 J38	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20. F	J37. 1	Power Ground		
2		J26. N	.1 Sec; 5 Hz; To Anti-lock ÷12 (OUT)		
3	J17. CC	J39. F	$\overline{A}$ Digit 3 L. S. B.		
4		J37. 20	A Digit 3 L. S. B.		
5	J17. DD	J39. 8	$\overline{B}$ Digit 3		
6		J37. 18	B Digit 3		
7	J17. HH	J39. 16	$\overline{A}$ Digit 4 L. S. B.		
8		J37. U	A Digit 4 L. S. B.		
9	J17. JJ	J39. 18	$\overline{B}$ Digit 4		
10		J37. T	B Digit 4		
11		J37. S	C Digit 4		
12	J17. KK	J39. S	$\overline{C}$ Digit 4		
13		J37. 21	D Digit 4 M. S. B.		
14	J17. LL	J39. T	$\overline{D}$ Digit 4 M. S. B.		
15		J37. 17	C Digit 3		
16	J17 EE	J39. J	$\overline{C}$ Digit 3		
17		J37. 19	D Digit 3 M. S. B.		
18	J17 FF	J39. K	$\overline{D}$ Digit 3 M. S. B.		
19		J37. E	.01 Sec.; 50 Hz (OUT)		
20		J37. R	Reset (IN)	1	
21		J37. F	.001 Sec., 500 Hz (OUT)		
22	P20. P		+5 VDC		
A	J17. U	J39. C	$\overline{A}$ Digit 1 L. S. B.		
B		J37. K	A Digit 1 L. S. B.		
C	J17. V	J39. 5	$\overline{B}$ Digit 1		
D		J37. 4	B Digit 1		
E	J17. Y	J39. V	$\overline{A}$ Digit 2 L. S. B.		
F		J37. 12	A Digit 2 L. S. B.		
H	J17. Z	J39. Z	$\overline{B}$ Digit 2		
J		J37. 10	B Digit 2		
K	J17. MM	J33. M	Data Block	0	
L		J37. 9	C Digit 2		
M	J17. AA	J39. 20	$\overline{C}$ Digit 2		
N		J37. 11	D Digit 2 M. S. B.		
P	J17. BB	J39. Y	$\overline{D}$ Digit 2 M. S. B		
R		J37. 3	C Digit 1		
S	J17. W	J39. 3	$\overline{C}$ Digit 1		
T		J37. 5	D Digit 1 M. S. B.		
U	J17. X	J39. D	$\overline{D}$ Digit 1 M. S. B		
V		J37. H	1 Sec.; 0.5 Hz (OUT)		
W		J37. L	1 Sec; 5 Hz (OUT)		
X		J37. W	100 kHz Clock (OUT)		
Y	P20. j		+12 VDC Pwr Supply		
Z		J37. 8	250 kHz Clock Out		

Table 7—1. (Sheet 46)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	P.C. Connector For Line Drivers
CARD NAME AND NUMBER	Buffer Line Drivers 95781

CONNECTOR DESIGNATION AND WIRING INFORMATION

Card 18 J39	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	P20.H	J40.1	Power Ground		
2		J37.C	Meas. Freq. Gate Input To Line Drivers	0	
3	J38.S		$\overline{C}$ Digit 1 (IN)		
4	J40.3	J16.S	$\overline{C}$ Digit 1 (OUT)		
5	J38.C		$\overline{B}$ Digit 1 (IN)		
6	J40.D	J16.T	$\overline{D}$ Digit 1 (OUT) M.S.B.		
7	J40.J	J16.AA	$\overline{C}$ Digit 3 (OUT)		
8	J38.5		$\overline{B}$ Digit 3 (IN)		
9	J40.8	J16.Z	$\overline{B}$ Digit 3 (OUT)		
10	J40.K	J16.BB	$\overline{D}$ Digit 3 (OUT) M.S.B.		
11	J27.R	J17.c	$\overline{A}$ Meas Code (IN) L.S.B.		
12	J40.P	J16.LL	$\overline{D}$ Meas Code (OUT) M.S.B.		
13	J40.R	J16.JJ	$\overline{B}$ Meas Code (OUT)		
14	J40.S	J16.EE	$\overline{C}$ Digit 4 (OUT)		
15	J40.16	J16.CC	$\overline{A}$ Digit 4 (OUT)		
16	J38.7		$\overline{A}$ Digit 4 (IN)		
17	J40.T	J16.FF	$\overline{D}$ Digit 4 (OUT)		
18	J38.9		$\overline{B}$ Digit 4 (IN)		
19	J40.20	J16.W	$\overline{C}$ Digit 2 (OUT)		
20	J38.M		$\overline{C}$ Digit 2 (IN)		
21	J40.Z	J16.V	$\overline{B}$ Digit 2 (OUT)		
22	P20.JJ	J40.22	+5 VDC		
A	J40.C	J16.P	$\overline{A}$ Digit 1 (OUT) L.S.B.		
B		J27.Z	Enables Buffer Gate On Meas. Lv./Noise (IN)	1	
C	J38.A		$\overline{A}$ Digit 1 (IN) L.S.B.		
D	J38.U		$\overline{D}$ Digit 1 (IN) M.S.B.		
E	J40.5	J16.R	$\overline{B}$ Digit 1 (OUT)		
F	J38.3		$\overline{A}$ Digit 3 (IN) L.S.B.		
H	J40.F	J16.Y	$\overline{A}$ Digit 3 (OUT) L.S.B.		
J	J38.16		$\overline{C}$ Digit 3 (IN)		
K	J38.18		$\overline{D}$ Digit 3 (IN) M.S.B.		
L	J40.11	J16.HH	$\overline{A}$ Meas. Code (OUT) L.S.B.		
M	J40.N	J16.KK	$\overline{C}$ Meas. Code (OUT)		
N	J27.12	J17.e	$\overline{C}$ Meas. Code (IN)		
P	J27.P	J17.f	$\overline{D}$ Meas. Code (IN) M.S.B.		
R	J27.13	J17.d	$\overline{B}$ Meas. Code (IN)		
S	J38.12		$\overline{C}$ Digit 4 (IN)		
T	J38.14		$\overline{D}$ Digit 4 (IN) M.S.B.		
U	J40.18	J16.DD	$\overline{B}$ Digit 4 (OUT)		
V	J38.E		$\overline{A}$ Digit 2 (IN) L.S.B.		
W	J40.V	J16.U	$\overline{A}$ Digit 2 (OUT) L.S.B.		
X	J40.Y	J16.X	$\overline{D}$ Digit 2 (OUT) M.S.B.		
Y	J38.P		$\overline{D}$ Digit 2 (IN) M.S.B.		
Z	J38.H		$\overline{B}$ Digit 2 (IN)		

Table 7—1. (Sheet 47)

ASSEMBLY NAME	Multi-Purpose Transmission Measuring System
ASSEMBLY NUMBER	8610
CONNECTOR FUNCTION	Data Information To Ext. Recorder
CARD NAME AND NUMBER	Ext. Recorder Buffer 96113

CONNECTOR DESIGNATION AND WIRING INFORMATION

J40	WIRE TO	WIRE FROM	CONNECTION FUNCTION	LOGIC STATE	FUNCTION REFERENCE
1	J39.1		Power Ground		
2					
3		J39.4	$\overline{C}$ Digit 1 (IN)		
4	J19.U		C Digit 1 (OUT)		
5		J39.E	$\overline{B}$ Digit 1 (IN)		
6	J19.V		D Digit 1 M.S.B. (OUT)		
7	J19.CC		C Digit 3 (OUT)		
8		J39.9	$\overline{B}$ Digit 3 (IN)		
9	J19.BB		B Digit 3 (OUT)		
10	J19.DD		D Digit 3 M.S.B. (OUT)		
11		J39.L	$\overline{A}$ Meas. Code (IN)		
12	J19.R		D Meas Code (OUT)		
13	J19.L		B Meas Code (OUT)		
14	J19.HH		C Digit 4 (OUT)		
15	J19.EE		A Digit 4 L.S.B. (OUT)		
16		J39.15	$\overline{A}$ Digit 4 (IN)		
17	J19.JJ		D Digit 4 M.S.B. (OUT)		
18		J39.U	$\overline{B}$ Digit 4 (IN)		
19	J19.Y		C Digit 2 (OUT)		
20		J39.19	C Digit 2 (IN)		
21	J19.X		B Digit 2 (OUT)		
22	J39.22		+5 VDC		
A	J19.S		A Digit 1 L.S.B. (OUT)		
B					
C		J39.A	$\overline{A}$ Digit 1 (IN)		
D		J39.6	$\overline{D}$ Digit 1 (IN)		
E	J19.T		B Digit 1 (OUT)		
F		J39.H	$\overline{A}$ Digit 3 (IN)		
H	J19.AA		A Digit 3 L.S.B. (OUT)		
J		J39,7	$\overline{C}$ Digit 3 (IN)		
K		J39.10	$\overline{D}$ Digit 3 (IN)		
L	J19.K		A Meas. Code L.S.B. (OUT)		
M	J19.P		C Meas Code (OUT)		
N		J39.M	$\overline{C}$ Meas Code (IN)		
P		J39.12	$\overline{D}$ Meas. Code (IN)		
R		J39.13	$\overline{B}$ Meas. Code (IN)		
S		J39.14	$\overline{C}$ Digit 4 (IN)		
T		J39.17	$\overline{D}$ Digit 4 (IN)		
U	J19.FF		B Digit 4 (OUT)		
V		J39.W	$\overline{A}$ Digit 2 (IN)		
W	J19.W		A Digit 2 L.S.B. (OUT)		
X	J19.Z		D Digit 2 M.S.B. (OUT)		
Y		J39.X	$\overline{D}$ Digit 2 (IN)		
Z		J39.21	B Digit 2 (IN)		

SECTION 8

PARTS LISTS

8.1 This section contains parts lists for components of the 8600 system. Refer to the assembly diagrams of Section 7 for physical locations of items shown on the parts lists.

Table 8—1. Model 8610A-CN Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CARDS1-3	DUAL LINE UNIT CARDS 001						A008610019
CARD15	A-D CONVERTER						A008610020
CARDS	8600 + 8615				ELECTRO	970195786	970195786
CARD	C-MSG FILTER						A008610012
CARD	AC-DC CONVERTER						A008610013
CARD	LOG CONVERTER						A008610015
CARD	OUT PUT BUFFER						A008610017
CARD	TIME BASE						A008610018
CARD	FUNCTION CONTROL						A008610021
CARD	SCANNER						A008610022
CARD	COUNTER ASSY 95772						A008610023
CARD	RANGING,SIGNAL,DET.+LOGIC						A008610028
CARD	START MEAS.DELAY & NOTCH						A008610051
CARD	DUAL LINE UNIT ASSY 96134						A008612011
DS1		53MA		48V	SYL	61	730000300
F1		6.25A		125V	LITTLEFUSE	3136.25	863102300
S1	DPDT	6A		125V	J-B-T	ST22N	620100600
S2		3A		125V	SWCRFT	46206L	645500400
S3		250MA			GRAYHILL	46-01-09-500-0101	635500300
S4		250MA			GRAYHILL	46-01-08-500-0101	635500400
T1	P50 TO 600 S50K SPLIT				NESHAMINY	AF-672	400200100
XF1	FUSEHOLDER,3AG PANEL				BUSSMAN	HKP	863000100

Table 8—2. Card Cage Assembly Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
J1-2	20PIN				ELCO	8016-020-000-707	653201500
J3-4	38PIN				ELCO	8016-038-000 707	653201100
J5-6	20PIN				ELCO	8016-020-000-707	653201500
J7-8	38PIN				ELCO	8016-038-000 707	653201100
J9-10	20PIN				ELCO	8016-020-000-707	653201500
J11-12	38PIN				ELCO	8016-038-000 707	653201100
J13-14	20PIN				ELCO	8016-020-000-707	653201500
J15	38PIN				ELCO	8016-038-000 707	653201100
J16-17	56PIN				ELCO	8016-056-000-707	653200800
J18-19	38PIN				ELCO	8016-038-000 707	653201100
J22-25	CONN,3101LP,TERMI-TWIST				AMP	2-67049-1	651901000
J26-40	CONN,22DILP,TERMI-TWIST				AMP	1-67031-5	651900200
J41	SPECIAL				TECH COMP	381C5N(TB)	650401950
R1	100-	2W	10%		CTS	550LT101A	231801010
R2	562-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220256201
R3	100-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210001
W1	HARNESS LAYOUT ASSY						A008610027
W2	COAX HARNESS W-2						A008610048

Table 8—3. Dual Line Assembly, Type 1 (Cards 1, 2, 3) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C4	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C7	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C8	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C9	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C10	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C11	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C12	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C13	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C14	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C15	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C16	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C17	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C18	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
CR1	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR2	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR3	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR4	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR7	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR8	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR9	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR10	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
Q1	TO-92 350MW TA	NPN	25V		MOTOROLA	MPS6515	550065150
Q2	TO-92 350MW TA	NPN	25V		MOTOROLA	MPS6515	550065150
Q3	TO-92 350MW TA	NPN	25V		MOTOROLA	MPS6515	550065150
Q4	TO-92 350MW TA	NPN	25V		MOTOROLA	MPS6515	550065150
R1	1K	1/4W	10%		AB	TYPE CB	200101026
R2	1K	1/4W	10%		AB	TYPE CB	200101026

Table 8—3. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R3	1K	1/4W	10%		AB	TYPE CB	200101026
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	1K	1/4W	10%		AB	TYPE CB	200101026
R6	1K	1/4W	10%		AB	TYPE CB	200101026
R7	1K	1/4W	10%		AB	TYPE CB	200101026
R8	1.8K	1/4W	10%		AB	TYPE CB	200101826
R9	100K	1/4W	10%		AB	TYPE CB	200101046
R10	1K	1/4W	10%		AB	TYPE CB	200101026
R11	2.2K	1/4W	10%		AB	TYPE CB	200102226
R12	2.2K	1/4W	10%		AB	TYPE CB	200102226
R13	2.2K	1/4W	10%		AB	TYPE CB	200102226
R14	2.2K	1/4W	10%		AB	TYPE CB	200102226
R15	100K	1/4W	10%		AB	TYPE CB	200101046
R16	1.8K	1/4W	10%		AB	TYPE CB	200101826
R17	8.2K	1/4W	10%		AB	TYPE CB	200108226
R18	8.2K	1/4W	10%		AB	TYPE CB	200108226
R19	100K	1/4W	10%		AB	TYPE CB	200101046
R20	100K	1/4W	10%		AB	TYPE CB	200101046
R21	1K	1/4W	10%		AB	TYPE CB	200101026
R22	1K	1/4W	10%		AB	TYPE CB	200101026
R23	4.7K	1/4W	10%		AB	TYPE CB	200104726
R24	4.7K	1/4W	10%		AB	TYPE CB	200104726
U1	14DIP-P				UTL SIGNETICS	SP314A	510003140
U2	14DIP-P				TTL TI	SN7401N	510074010
U3	14DIP-P				TTL TI	SN7401N	510074010
U4	14DIP-P				UTL SIGNETICS	SP314A	510003140
U5	14DIP-P				TTL TI	SN7401N	510074010
U6	14DIP-P				TTL TI	SN7401N	510074010
U7	16DIP-P				TTL TI	SN7476N	510074760
U8	14DIP-P				TTL TI	SN7401N	510074010
U9	14DIP-P				TTL TI	SN7401N	510074010
U10	8DIP-P				DS TI	SN754518P	510075451

Table 8—4. Dual Line Unit, Type 2 (Card 4) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C4	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C7	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C8	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C9	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C10	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C11	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C12	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C13	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C14	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C15	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C16	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C17	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C18	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040

Table 8—4. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR1-4	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR7	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR8	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR9-12	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
K1	RELAY						A008610116
K2	RELAY						A008610116
Q1	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q2	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q3	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q4	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q5	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q6	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
R1	1K	1/4W	10%		AB	TYPE CB	200101026
R2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	1K	1/4W	10%		AB	TYPE CB	200101026
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	1K	1/4W	10%		AB	TYPE CB	200101026
R6	1K	1/4W	10%		AB	TYPE CB	200101026
R7	10K	1/4W	10%		AB	TYPE CB	200101036
R8	1.8K	1/4W	10%		AB	TYPE CB	200101826
R9	100K	1/4W	10%		AB	TYPE CB	200101046
R10	1K	1/4W	10%		AB	TYPE CB	200101026
R11	4.7K	1/4W	10%		AB	TYPE CB	200104726
R12	2.2K	1/4W	10%		AB	TYPE CB	200102226
R13	2.2K	1/4W	10%		AB	TYPE CB	200102226
R14	10K	1/4W	10%		AB	TYPE CB	200101036
R15	100K	1/4W	10%		AB	TYPE CB	200101046
R16	1.8K	1/4W	10%		AB	TYPE CB	200101826
R17	8.2K	1/4W	10%		AB	TYPE CB	200108226
R18	8.2K	1/4W	10%		AB	TYPE CB	200108226
R19	100K	1/4W	10%		AB	TYPE CB	200101046
R20	100K	1/4W	10%		AB	TYPE CB	200101046
R21	1K	1/4W	10%		AB	TYPE CB	200101026
R22	1K	1/4W	10%		AB	TYPE CB	200101026
R23	1K	1/4W	10%		AB	TYPE CB	200101026
R24	2.2K	1/4W	10%		AB	TYPE CB	200102226
R25	4.7K	1/4W	10%		AB	TYPE CB	200104726
R26	2.2K	1/4W	10%		AB	TYPE CB	200102226
R27	4.7K	1/4W	10%		AB	TYPE CB	200104726
R28	100K	1/4W	10%		AB	TYPE CB	200101046
R29	10K	1/4W	10%		AB	TYPE CB	200101036
R30	10K	1/4W	10%		AB	TYPE CB	200101036
R31	100K	1/4W	10%		AB	TYPE CB	200101046
R32	4.7K	1/4W	10%		AB	TYPE CB	200104726
R33	10K	1/4W	10%		AB	TYPE CB	200101036
R34	4.7K	1/4W	10%		AB	TYPE CB	200104726
R35	4.7K	1/4W	10%		AB	TYPE CB	200104726
U1	14DIP-P				UTL SIGNETICS	SP314A	510003140
U2	14DIP-P				TTL TI	SN7401N	510074010
U3	14DIP-P				TTL TI	SN7401N	510074010
U4	14DIP-P				UTL SIGNETICS	SP314A	510003140
U5	14DIP-P				TTL TI	SN7401N	510074010
U6	14DIP-P				TTL TI	SN7401N	510074010
U7	16DIP-P				TTL TI	SN7476N	510074760
U8	14DIP-P				TTL TI	SN7401N	510074010
U9	14DIP-P				TTL TI	SN7401N	510074010
U10	8DIP-P				DS TI	SN75451BP	510075451

Table 8—4. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
U11	14DIP-P			TTL	TI	SN7401N	510074010
U12	14DIP-P			TTL	TI	SN7473N	510074730
U13	14DIP-P			TTL	TI	SN7404N	510074040
U14	14DIP-P			TTL	TI	SN7401N	510074010

Table 8—5. Scanner (Card 5) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.082UF		10%	100V	SPRAGUE	225P82391WD3	320008230
C2	.082UF		10%	100V	SPRAGUE	225P82391WD3	320008230
C3	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C4	.1UF	A	20%	35V	SPRAGUE	196D104X0035HA1	310801040
C5	470PF	Z5FTC	10%	1KV	CENTRALAB	DD-471	330004710
C6	.1UF	A	20%	35V	SPRAGUE	196D104X0035HA1	310801040
C7	.1UF	A	20%	35V	SPRAGUE	196D104X0035HA1	310801040
C8	510PF	Z5RTC	10%	1KV	CENTRALAB	DD-511	330005110
C9	100UF			16V	SPRAGUE	TE-1162	300201071
C10	330PF	Z5FTC	10%	1KV	CENTRALAB	DD-331	330003310
C11	.01UF		00	50V	CENTRALAB	CK-103	330701030
C12	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C13	.1UF	A	20%	35V	SPRAGUE	196D104X0035HA1	310801040
CR1	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR2	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR3	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR4	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR5	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR6	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR7	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR8	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
Q1	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q2	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q3	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q4	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
R1	22K	1/4W	10%		AB	TYPE CB	200102236
R2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	1K	1/4W	10%		AB	TYPE CB	200101026
R4	22K	1/4W	10%		AB	TYPE CB	200102236
R5	100K	1/4W	10%		AB	TYPE CB	200101046
R6	470-	1/4W	10%		AB	TYPE CB	200104716
R7	12K	1/4W	10%		AB	TYPE CB	200101236
R8	4.7K	1/4W	10%		AB	TYPE CB	200104726
R9	10K	1/4W	10%		AB	TYPE CB	200101036
R10	4.7K	1/4W	10%		AB	TYPE CB	200104726
R11	8.2K	1/4W	10%		AB	TYPE CB	200108226
R12	6.8K	1/4W	10%		AB	TYPE CB	200106826
R13	8.2K	1/4W	10%		AB	TYPE CB	200108226
R14	330-	1/4W	10%		AB	TYPE CB	200103316
R15	10K	1/4W	10%		AB	TYPE CB	200101036
R16	10K	1/4W	10%		AB	TYPE CB	200101036
R17	4.7K	1/4W	10%		AB	TYPE CB	200104726
R18	4.7K	1/4W	10%		AB	TYPE CB	200104726
R19	10K	1/4W	10%		AB	TYPE CB	200101036
R20	4.7K	1/4W	10%		AB	TYPE CB	200104726
R21	56-	1/4W	10%		AB	TYPE CB	200105606

Table 8—5. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R22	4.7K	1/4W	10%		AB	TYPE CB	200104726
R23	470-	1/4W	10%		AB	TYPE CB	200104716
R24	10-	1/4W	10%		AB	TYPE CB	200101006
R25	22K	1/4W	10%		AB	TYPE CB	200102236
U1	14DIP-P			TTL	TI	SN7404N	510074040
U2	14DIP-P			TTL	TI	SN7404N	510074040
U3	16DIP-P			TTL	TI	SN74151N	510074151
U4	16DIP-P			TTL	TI	SN7442N	510074420
U5	14DIP-P			TTL	TI	SN74121N	510074121
U6	16DIP-P			TTL	TI	SN7476N	510074760
U7	16DIP-P			TTL	TI	SN7476N	510074760
U8	14DIP-P			TTL	TI	SN7401N	510074010
U9	8DIP-P			DS	TI	SN75451BP	510075451
U10	14DIP-P			TTL	TI	SN74121N	510074121
U11	16DIP-P			TTL	TI	SN7476N	510074760
U12	14DIP-P			TTL	TI	SN74121N	510074121
U13	14DIP-P			TTL	TI	SN7492AN	510074920
U14	14DIP-P			TTL	TI	SN74121N	510074121

Table 8—6. Function Control (Card 6) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C2	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C3	.15UF		20%	35V	SPRAGUE	196D154X0035HA1	310801540
C4	500PF		10%	1KV	CRL	DD-501	330005010
C5	1000PF	Z5RTC	10%	1KV	CENTRALAB	DD-102	330001020
CR1-12	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR13	D035 4NS	10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR14	D035 4NS	10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR15	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR16	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
K1	RELAY						A008610122
Q1	TO-92	350MW	TA	NPN	25V	MOTOROLA	MPS6515	550065150
R1	3.9K	1/4W	10%		AB	TYPE CB	200103926
R2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	100K	1/4W	10%		AB	TYPE CB	200101046
R4	10K	1/4W	10%		AB	TYPE CB	200101036
R5	10K	1/4W	10%		AB	TYPE CB	200101036
R6	10K	1/4W	10%		AB	TYPE CB	200101036
R7	10K	1/4W	10%		AB	TYPE CB	200101036
R8-11	4.7K	1/4W	10%		AB	TYPE CB	200104726
R13	10-	1/4W	10%		AB	TYPE CB	200101006
R14	1K	1/4W	10%		AB	TYPE CB	200101026
R15	10K	.75W	10%		HELIPOT	89PR10K	232501030
R16	56-	1/4W	10%		AB	TYPE CB	200105606
U1	14DIP-P			TTL	TI	SN7420N	510074200
U2	14DIP-P			TTL	TI	SN7401N	510074010
U3	14DIP-P			TTL	TI	SN7402N	510074020
U4	14DIP-P			TTL	TI	SN7400N	510074000

Table 8—6. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
U5	14DIP-P			TTL	TI	SN7404N	510074040
U6	14DIP-P			TTL	TI	SN7400N	510074000
U7	14DIP-P			TTL	TI	SN74121N	510074121
U8	14DIP-P			TTL	TI	SN7473N	510074730
2A	22UF		F 20%	35V	SPRAGUE	196D226X0035PE4	310802261

Table 8—7. Input Amplifier And C-Message Filter (Card 7) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF	A	20%	50V	SPRAGUE	196D104X0050HA1	310801041
C2	.1UF	A	20%	50V	SPRAGUE	196D104X0050HA1	310801041
C3	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C4	22UF		10%	6V	KEMET	T330A226K006AS	310002260
C5	2000PF	Z5UTC	20%	1KV	CENTRALAB	DD-202	330002020
C6	500PF		10%	1KV	CRL	DD-501	330005010
C7	.2UF		10%	100V	F-DYNE	MPE11-.2-100-10	321902040
C8	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C9	.2UF		10%	100V	F-DYNE	MPE11-.2-100-10	321902040
C10	.15UF		10%	100V	F-DYNE	MPE12-.15-100-10	321901540
C11	.25UF		10%	100V	F-DYNE	MPE11-.25-100-10	321902540
C12	.2UF		10%	100V	F-DYNE	MPE11-.2-100-10	321902040
C13	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C14	200PF	S3NTC	10%	1KV	CENTRALAB	DD-201	330002010
C15	10PF	S2LTC	10%	1KV	CENTRALAB	DD-100	330001000
C16	100UF			16V	SPRAGUE	TE-1162	300201071
C17	100UF			16V	SPRAGUE	TE-1162	300201071
C18	.22UF		10%	100V	SPRAGUE	225P22491XD3	320002240
C20	1000PF	Z5RTC	10%	1KV	CENTRALAB	DD-102	330001020
C21	.0027UF		2%	100V	F-DYNE	PS11-0027-100-1	321502722
C22	.01UF		1%	100V	F-DYNE	PS11-01-100-1	321501031
C23	200PF		5%	500V	ELMENCO	CM15-E201J	335002010
C24	500PF		10%	1KV	CRL	DD-501	330005010
C25	1000PF	Z5RTC	10%	1KV	CENTRALAB	DD-102	330001020
C26	2000PF	Z5UTC	20%	1KV	CENTRALAB	DD-202	330002020
C27	47PF	S2LTC	10%	1KV	CENTRALAB	DD-470	330004700
C28	.1UF	W5RTC	10%	50V	USCC	CW30C104K	330801041
CR1	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR3-4	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR10-11	D041	1A	SI	200V	EDAL	1N4003	560040030
CR12-20	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
K1	RELAY						A008610122
K2	RELAY						A008610122
L1	150MH	22MA	2%		TRIAD	EA-150	460100200
L2	30MH	50MA	2%		TRIAD	EA-030	460100100
L3	30MH	50MA	2%		TRIAD	EA-030	460100100
Q1-3	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q4	TO92	310MW TA	P	40V	MOTOROLA	MPF152 2N5461	555001520
Q5-6	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
R1	560-	1/4W	10%		AB	TYPE CB	200105616
R2	100K	1/4W	10%		AB	TYPE CB	200101046
R3	560-	1/4W	10%		AB	TYPE CB	200105616

Table 8—7. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R4	100K	1/4W	10%		AB	TYPE CB	200101046
R5	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R6	210K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221031
R7	100-	1/4W	10%		AB	TYPE CB	200101016
R8	390-	1/4W	10%		AB	TYPE CB	200103916
R9	604-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220260401
R10	681-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268101
R11	619-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220261901
R12	84.5-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220284591
R13	1.8K	1/4W	10%		AB	TYPE CB	200101826
R14	187-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220218701
R15	604-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220260401
R16	1.37K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220213711
R17	2K	.75W	10%		HELIPOT	89PR2K	232502020
R18	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220228721
R19	1.5K	1/4W	10%		AB	TYPE CB	200101526
R20	56-	1/4W	10%		AB	TYPE CB	200105606
R21	27-	1/4W	10%		AB	TYPE CB	200102706
R22	27-	1/4W	10%		AB	TYPE CB	200102706
R23	8.06K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220280611
R24	10K	.75W	10%		HELIPOT	89PR10K	232501030
R25	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R26	10K	1/4W	10%		AB	TYPE CB	200101036
R27	4.7K	1/4W	10%		AB	TYPE CB	200104726
R28	2550-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220225511
R29	10K	1/4W	10%		AB	TYPE CB	200101036
R30	2.7K	1/4W	10%		AB	TYPE CB	200102726
R31	1K	1/4W	10%		AB	TYPE CB	200101026
R32	4.7K	1/4W	10%		AB	TYPE CB	200104726
R33	3.65K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220236511
R34	3.65K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220236511
R35	3.65K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220236511
R36	100-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210001
R37	560-	1/4W	10%		AB	TYPE CB	200105616
R38	10K	1/4W	10%		AB	TYPE CB	200101036
R39	10K	1/4W	10%		AB	TYPE CB	200101036
R40	100K	1/4W	10%		AB	TYPE CB	200101046
R41	100K	1/4W	10%		AB	TYPE CB	200101046
U1	14DIP-P			TTL	TI	SN7401N	510074010
U2	14DILP			18V	FAIRCHILD	715DC	500007150
U3	14DILP				TI	SN72709N	500007090
U4	14DILP			18V	FAIRCHILD	715DC	500007150

Table 8—8. Option 3, Percent Break Converter (Card 8) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	4.7UF		10%	50V	KEMET	T330C475K050AS	310004750
C2	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C3	10UF		10%	25V	KEMET	T330C106K025AS	310001061
C4	68UF		10%	15V	KEMET	T362C686K015AS	310006860
C5	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C6	.01UF	W5R TC	10%	100V	ERIE	8121-100-W5R0-103K	330001032
C7	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C8	270PF	Z5FTC	10%	1KV	CENTRALAB	DD-271	330002710
C9-10	.01UF	W5R TC	10%	100V	ERIE	8121-100-W5R0-103K	330001032
C11-14	.01UF		20%	16V	CENTRALAB	UK16-103	330701031

Table 8—8. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C15	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C16	560PF	Z5RTC	10%	1KV	CENTRALAB	DD-561	330005610
C17	.1UF	W5RTC	10%	50V	USCC	CW30C104K	330801041
C18	.02UF		10%	100V	F-DYNE	PE12-.02-100-10	322102030
C19	.01UF		20%	16V	CENTRALAB	UK16-103	330701031
C20	.005UF		20%	50V	CENTRALAB	CK-502	330705020
CR1	A21	200MW	SI	60V	TI	1N457	560004570
CR2-3	DO35	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR6-7	OUTL.15	250MW		100P	H PACKARD	5082-2800	561550820
CR8	A21	200MW	SI	60V	TI	1N457	560004570
CR9-12	DO35	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
K1	REED RELAY						A008612118
Q1-3	TO-92	350MW TA	NPN	40V	MOTOROLA	2N3903	550039030
R1	470-	1/4W	10%		AB	TYPE CB	200104716
R2-3	820-	1/4W	10%		AB	TYPE CB	200108216
R5	1K	1/4W	10%		AB	TYPE CB	200101026
R6	680-	1/4W	10%		AB	TYPE CB	200106816
R7	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R8	3.3K	1/4W	10%		AB	TYPE CB	200103326
R9	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R10	22K	1/4W	10%		AB	TYPE CB	200102236
R11	100K	1/4W	10%		AB	TYPE CB	200101046
R12	3.3K	1/4W	10%		AB	TYPE CB	200103326
R13	220-	1/4W	10%		AB	TYPE CB	200102216
R14	68-	1/2W	5%		AB	TYPE EB	200206805
R15	3.3K	1/4W	10%		AB	TYPE CB	200103326
R16	12K	1/4W	10%		AB	TYPE CB	200101236
R17	47K	1/4W	10%		AB	TYPE CB	200104736
R18	15K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220215021
R19	20K	1/2W	10%	200V	HELIPOT	72XWR20K	232702031
R20-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	4.7K	1/4W	10%		AB	TYPE CB	200104726
R23	39-	1/4W	10%		AB	TYPE CB	200103906
R24	73.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220273221
R25	4.7K	1/4W	10%		AB	TYPE CB	200104726
R26	47K	1/4W	10%		AB	TYPE CB	200104736
U1	14DIP-P			TTL	TI	SN74121N	510074121
U2	14DIP-P			UTL	SIGNETICS	SP384A	510003840
U3	14DIP-P			TTL	TI	SN7490AN	510074900
U4-5	14DIP-P		L	TTL	T.I.	SN74L90	510074901
U6-8	14DIP-P			TTL	T.I.	SN7485N	510074850
U9-11	16DIP-P			TTL	TI	SN74161N	510074161
U12-14	14DILP				TI	SN74L93N	510507493
U15-17	16DILP				TI	SN74L193N	510574193
U18	16DIP-P			TTL	TI	SN74123N	510074123
U19	14PDIL	L/P			TI	SN74L73N	510507473
U20	14DILP				TI	SN74L10N	510507410
U21	14DIP-P			TTL	TI	SN7412N	510007412
U22	14PDIL	L/P			TI	SN74L74N	510507474
U23	14DIP-P			TTL	TI	SN7405N	510074050
U24	14DIP-P			TTL	TI	SN74132	510074132
U25	14DIP-P			TTL	TI	SN7400N	510074000
U26	8DIP-P			LM	SIGNETICS	NE 555V	510005550
U27	8DIP-P			DS	TI	SN75451BP	510075451
U28	14DIP-P			TTL	TI	SN7404N	510074040

Table 8—9. Percent Break Regulator Board Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
C2	.47UF	Z5UTC	20%	25	SPRAGUE	5C023474X0500C5	330504740
U1	TO-3			5V	FAIRCHILD	7805KC	500078051

Table 8—10. Start Meas Delay And Notch Filter (Card 9) Parts List

REFERENCE DESIGNATOR	D E S C R I P T I O N VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1-2	.1UF		20%	100V	VITRAMON	VK33BW104M	331001040
C3	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
C4-5	.01UF	Z5U TC	00	50V	CRL	CZ15C103Z	330801031
C6	30PF		2%	500V	ELMENCO	CM04ED300GO-	335403000
C7	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C8-10	.01UF	Z5U TC	00	50V	CRL	CZ15C103Z	330801031
C11	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
CR1-2	A1 300N 30M	SI	.1MA	TI		1N661	560006610
CR3-15	DO35 4NS 10MA	SI	50UA	FAIRCHILD		1N4148	560041480
FL1	1010 HZ				ESC ELECT.	ESC 42F86	470100700
K1-2	RELAY						A008610122
Q1	TO-92 350MW TA	NPN	25V	MOTOROLA		MPS6515	550065150
Q2	TO-92 625MW TA	NPN	80V	MOTOROLA		MPS-A06	550000060
R1	110K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211031
R2	604-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220260401
R3-4	110K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211031
R5	604-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220260401
R6-14	47K	1/4W	10%		AB	TYPE CB	200104736
R15	10K	1/4W	10%		AB	TYPE CB	200101036
R16	2.2K	1/4W	10%		AB	TYPE CB	200102226
R17	6.8K	1/4W	10%		AB	TYPE CB	200106826
R18	470-	1/4W	10%		AB	TYPE CB	200104716
R19	4.7K	1/4W	10%		AB	TYPE CB	200104726
R20	470-	1/4W	10%		AB	TYPE CB	200104716
R21-22	100K	1/4W	10%		AB	TYPE CB	200101046
U1	8PDIL			22V	SIGNETICS	NE531	500005310
U2-3	14DIP-P	B		CMOS	RCA	CD4011	510004011
U4-5	14DIP-P			TTL	TI	SN7401N	510074010
U6	14DIP-P			TTL	TI	SN74121N	510074121

Table 8—11. Option 4, 3-kHz Filter (Card 10) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.05UF		10%	100V	SPRAGUE	225P50391WD3	320005030
C2	.006UF		10%	100V	SPRAGUE	225P60291WD3	320006020
C3	.001UF		10%	100V	SPRAGUE	225P10291WD3	320001020
C4	2500PF		5%	500V	ELMENCO	CM19-E252J	335102520
C5	100UF			16V	SPRAGUE	TE-1162	300201071
C6	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C7	100UF			16V	SPRAGUE	TE-1162	300201071
C8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
C10	10UF		20%	25V	TSI	PA10EH25NPT	301301060
CR1-3	DO35 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
K1-2	RELAY						A008610122
Q1	TO-5	1W TA	NPN	65V	RCA	2N2102	550021020
R1	909-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220290901
R2	1000-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210011
R3	500-	.75W	10		HELIPOT	89PR500	232505010
R4	47.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220247521
R5	26.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220226121
R6	27-	1/4W	10%		AB	TYPE CB	200102706
R7	10K	1/4W	10%		AB	TYPE CB	200101036
R8	27-	1/4W	10%		AB	TYPE CB	200102706
R9	1.5K	1/4W	10%		AB	TYPE CB	200101526
R10	100K	1/4W	10%		AB	TYPE CB	200101046
U1	14DIP-P			TTL	TI	SN74C1N	510074010
U2	14DILP				FAIRCHILD	741PC	500007410

Table 8—12. Option 7, 15-kHz Filter (Card 10 or 11) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C-10	2.2UF	Y5V TC	20%	50V	ERIE	8141-050-651-225M	330802250
C1	180PF		5%	500V	ELMENCO	CM15-E181J	335001810
C2	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C3	180PF		5%	500V	ELMENCO	CM15-E181J	335001810
C4	8-50PF			350V	ERIE	557-091E-8-50	340005000
C5	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C6	100UF			16V	SPRAGUE	TE-1162	300201071
C7	100UF			16V	SPRAGUE	TE-1162	300201071
C8	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
CR1	DO35 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR2	DO35 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
CR3	DO35 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
K1	RELAY						A008610122
K2	RELAY						A008610122
Q1	TO-5	1W TA	NPN	65V	RCA	2N2102	550021020
R1	10K	1/4W	10%		AB	TYPE CB	200101036
R2	604-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220260401
R3	68.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268121
R4	56-	1/4W	10%		AB	TYPE CB	200105606

Table 8—12. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R5	332K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220233231
R6	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R7	2K	.75W	10%		HELIPOT	89PR2K	232502020
R8	10K	1/4W	10%		AB	TYPE CB	200101036
R9	27-	1/4W	10%		AB	TYPE CB	200102706
R10	27-	1/4W	10%		AB	TYPE CB	200102706
R11	1.5K	1/4W	10%		AB	TYPE CB	200101526
R12	100K	1/4W	10%		AB	TYPE CB	200101046
U1	14DIP-P			TTL	TI	SN74C1N	510074010
U2	14DILP				FAIRCHILD	741PC	500007410

Table 8—13. Ranging Signal Detector (Card 12) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1-3	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C6	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C7	150PF	S3NTC	10%	1KV	CENTRALAB	DD-151	330001510
C8	.05UF		20%	50V	CENTRALAB	CK503	330705030
C9	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C10	.22UF	A	10%	50V	SPRAGUE	196D224X9050HA1	310802240
C13	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
CR1-8	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR9	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR10-11	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR12	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR13	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR14	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR15-16	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR17-20	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR21-22	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR23	OUTL.15	250MW		100P	H PACKARD	5082-2800	561550820
CR24-25	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR26-27	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR28	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
K1	RELAY REED 1C-PC M/O 4V						A008612107
Q1-2	TO92 310MW TA	P		40V	MOTOROLA	MPF152 2N5461	555001520
Q3-9	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
Q10	TO92 310MW TA	P		40V	MOTOROLA	MPF152 2N5461	555001520
Q11	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
R1	11.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211321
R2	76.8-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220276891
R3	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R4	9530-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220295311
R5-6	10K	1/4W	10%		AB	TYPE CB	200101036
R7	1.8K	1/4W	10%		AB	TYPE CB	200101826
R8	2.7K	1/4W	10%		AB	TYPE CB	200102726
R9	10K	1/4W	10%		AB	TYPE CB	200101036
R10	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R11	4.7K	1/4W	10%		AB	TYPE CB	200104726
R12	10K	1/4W	10%		AB	TYPE CB	200101036
R13	560K	1/4W	10%		AB	TYPE CB	200105646
R14	50K	.75W	10		HELIPOT	89PR50K	232505030

Table 8—13. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R15	10K	1/4W	10%		AB	TYPE CB	200101036
R16	22.6K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220222621
R17	22K	1/4W	10%		AB	TYPE CB	200102236
R18	100K	1/4W	10%		AB	TYPE CB	200101046
R19	3.3K	1/4W	10%		AB	TYPE CB	200103326
R20	8.2K	1/4W	10%		AB	TYPE CB	200108226
R21	10K	1/4W	10%		AB	TYPE CB	200101036
R22	3.9K	1/4W	10%		AB	TYPE CB	200103926
R23	12K	1/4W	10%		AB	TYPE CB	200101236
R24	4.7K	1/4W	10%		AB	TYPE CB	200104726
R25	560K	1/4W	10%		AB	TYPE CB	200105646
R26	47K	1/4W	10%		AB	TYPE CB	200104736
R27	100K	1/4W	10%		AB	TYPE CB	200101046
R28	270K	1/4W	10%		AB	TYPE CB	200102746
R29	47K	1/4W	10%		AB	TYPE CB	200104736
R30	27K	1/4W	10%		AB	TYPE CB	200102736
R31	270K	1/4W	10%		AB	TYPE CB	200102746
R32-33	10K	1/4W	10%		AB	TYPE CB	200101036
R34	4.7K	1/4W	10%		AB	TYPE CB	200104726
R35	47K	1/4W	10%		AB	TYPE CB	200104736
R36	560K	1/4W	10%		AB	TYPE CB	200105646
R37	100K	1/4W	10%		AB	TYPE CB	200101046
R38	4.7K	1/4W	10%		AB	TYPE CB	200104726
R39-40	1K	1/4W	10%		AB	TYPE CB	200101026
R41	100-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210001
R42	12.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212121
R43	3740-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220237411
R44	6810-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268111
R45	10K	1/4W	10%		AB	TYPE CB	200101036
R46-47	2.7K	1/4W	10%		AB	TYPE CB	200102726
R48	10K	1/4W	10%		AB	TYPE CB	200101036
R49	1K	1/4W	10%		AB	TYPE CB	200101026
R50	15K	1/4W	10%		AB	TYPE CB	200101536
R51-52	4.7K	1/4W	10%		AB	TYPE CB	200104726
R53	7.32K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220273211
R54	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R55	39K	1/4W	10%		AB	TYPE CB	200103936
R56	120K	1/4W	10%		AB	TYPE CB	200101246
R57	4.7K	1/4W	10%		AB	TYPE CB	200104726
R58	100K	1/4W	10%		AB	TYPE CB	200101046
R59	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R60	5.62K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220256211
R61	1M	1/4W	10%		AB	TYPE CB	200101056
R62	2.7K	1/4W	10%		AB	TYPE CB	200102726
R63-65	100K	1/4W	10%		AB	TYPE CB	200101046
R66-67	1K	1/4W	10%		AB	TYPE CB	200101026
U1-2	8PD1L	80MW		180V	NAT.SEMI	LM1458N	500001458
U3-4	14DIP-P			TTL	TI	SN7472N	510074720
U5	14DILP				FAIRCHILD	739PC	500007390
U6	14DIP-P			TTL	TI	SN7401N	510074010

Table 8—14. AC/DC Converter (Card 13) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C2	10PF		5%	500V	ELMENCO	CM15-C100J	335001000
C3	11-110PF			500V	ERIE	503-001-F11-110	340301110
C4	1000PF		5%	500V	ELMENCO	CM20E102J	335001020
C5	.47UF	Z5UTC	20%	25	SPRAGUE	5C023474X0500C5	330504740
C6	510PF	Z5RTC	10%	1KV	CENTRALAB	DD-511	330005110
C7	.47UF	Z5UTC	20%	25	SPRAGUE	5C023474X0500C5	330504740
C8	014UF		2%	100V	F-DYNE	PE12-.014-100-2	322101430
C9	22PF	S2LTC	10%	1KV	CENTRALAB	DD-220	330002200
C10	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
C11	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C12	56UF		10%	15V	SPRAGUE	150D566X9015R2	310305660
C13	100UF			16V	SPRAGUE	TE-1162	300201071
C14	10UF		10%	50V	TRW	X463UW	321301060
C15	22UF		10%	15V	SPRAGUE	150D226X9015B2	310302260
C16-18	10UF		10%	50V	TRW	X463UW	321301060
C19	.15UF		10%	50V	KEMET	T33DA154K050AS	310001540
C20	2.2UF		10%	35V	SPRAGUE	150D225X9035B	310302251
C21	1.5UF		10%	35V	KEMET	T330A155K035AS	310001551
C22	.15UF		10%	50V	KEMET	T33DA154K050AS	310001540
C23-26	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C27	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C28-30	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C31	200UF			16V	C.DUBILIER	NLW-200-16	300902070
C32	.01UF		00	50V	CENTRALAB	CK-103	330701030
C33	22UF	F	20%	35V	SPRAGUE	196D226X0035PE4	310802261
C34	1.5UF		10%	35V	KEMET	T330A155K035AS	310001551
C35	.047UF	W5R TC	10%	50V	ERIE	8131M050W5R473K	330804730
CR1-2	DO35 4NS 10MA	SI		50UA	FAIRCHILD	1N4148	560041480
CR3	A16Z	80MW	GE	50V	TRANS.	1N198	561001980
CR4-7	DO35 4NS 10MA	SI		50UA	FAIRCHILD	1N4148	560041480
CR8-9	OUTL.15	250MW		100P	H PACKARD	5082-2800	561550820
K1-2	RELAY						A008610122
K3	RELAY LAYOUT TOP VIEW						A008612114
Q1	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
Q2	TO92 310MW TA	P		40V	MOTOROLA	MPF152 2N5461	555001520
Q3	TO-92 350MW TA	NPN		40V	MOTOROLA	2N3903	550039030
Q4	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
Q7	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
Q8-11	TO92 310MW TA	P		40V	MOTOROLA	MPF152 2N5461	555001520
Q12	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
Q13-14	TO92 310MW TA	P		40V	MOTOROLA	MPF152 2N5461	555001520
Q15-16	TO-92 350MW TA	NPN		40V	MOTOROLA	2N3903	550039030
R1	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R2	31.6K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220231621
R3	20K	.75W	10%		HELIPOT	89PR20K	232502030
R4	1130-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211311
R5	1.5K	1/4W	10%		AB	TYPE CB	200101526
R6	100K	1/4W	10%		AB	TYPE CB	200101046
R7	470K	1/4W	10%		AB	TYPE CB	200104746
R8	1270-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212711
R9	348-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220234801
R10	1.5K	1/4W	10%		AB	TYPE CB	200101526
R11	56-	1/4W	10%		AB	TYPE CB	200105606
R12	93.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220293121
R13	10M	1/2W	10%		AB	TYPE EB	200201066
R14	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711

Table 8—14. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R15	390K	1/4W	10%		AB	TYPE CB	200103946
R16	10K	1/4W	10%		AB	TYPE CB	200101036
R17	2.2K	1/4W	10%		AB	TYPE CB	200102226
R18	4750-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220247511
R19	68.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268121
R20-22	1000-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210011
R23	22.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220222121
R24	1000-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210011
R25	100K	1/4W	10%		AB	TYPE CB	200101046
R26	3480-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220234811
R27	100K	1/4W	10%		AB	TYPE CB	200101046
R28	3480-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220234811
R29	4750-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220247511
R30	3.65K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220236511
R31	392-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220239201
R32	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R33	51.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251121
R34	392-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220239201
R35	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R36	51.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251121
R37	3.3M	1/2W	10%		AB	TYPE EB	200203356
R38	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131
R39	50K	.75W	10		HELIPOT	89PR50K	232505030
R41	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R42	39K	1/4W	10%		AB	TYPE CB	200103936
R43	200K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220220031
R44	100K	.75W	10%		HELIPOT	89PR100K	232501040
R45	174K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217431
R46	56-	1/4W	10%		AB	TYPE CB	200105606
R47	100K	1/4W	10%		AB	TYPE CB	200101046
R48	100K	1/4W	10%		AB	TYPE CB	200101046
R49	100K	1/4W	10%		AB	TYPE CB	200101046
R50	10K	1/4W	10%		AB	TYPE CB	200101036
R51	1.8K	1/4W	10%		AB	TYPE CB	200101826
R52	2.2K	1/2W	10%		AB	TYPE EB	200202226
R53	100K	1/4W	10%		AB	TYPE CB	200101046
R54	8.2K	1/4W	10%		AB	TYPE CB	200108226
R55	3.9K	1/4W	10%		AB	TYPE CB	200103926
R56	1K	1/4W	10%		AB	TYPE CB	200101026
R57	18K	1/4W	10%		AB	TYPE CB	200101836
R58	15K	1/4W	10%		AB	TYPE CB	200101536
R59	3.9K	1/4W	10%		AB	TYPE CB	200103926
R60	220-	1/4W	10%		AB	TYPE CB	200102216
R61	18K	1/4W	10%		AB	TYPE CB	200101836
R62	100K	1/4W	10%		AB	TYPE CB	200101046
R63	3.9K	1/4W	10%		AB	TYPE CB	200103926
R64	20K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220220021
R65	10K	1/4W	10%		AB	TYPE CB	200101036
R66	100-	1/4W	10%		AB	TYPE CB	200101016
R67	24.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220224321
R68	180-	1/4W	10%		AB	TYPE CB	200101816
R69	66.5K	1/8W	1%	1	ELECTRA	RN55 SIZE 100 PPM	220266521
R70	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R71	15K	1/4W	10%		AB	TYPE CB	200101536
R72	20K	1/2W	10%	200V	HELIPOT	62PR20K	232702036
R73	1.2M	1/4W	10%		AB	TYPE CB	200101256
R74	2.2K	1/4W	10%		AB	TYPE CB	200102226
R75	10-	1/4W	10%		AB	TYPE CB	200101006
R76	4750-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220247511
R77-78	1.2M	1/4W	10%		AB	TYPE CB	200101256
R79	22K	1/4W	10%		AB	TYPE CB	200102236

Table 8—14. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R80	100K	1/4W	10%		AB	TYPE CB	200101046
R81-82	22.6K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220222621
R83	100-	1/4W	10%		AB	TYPE CB	200101016
R84	6.8K	1/4W	10%		AB	TYPE CB	200106826
R85	120K	1/4W	10%		AB	TYPE CB	200101246
R86	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131
R87	50K	1/2W	10%	200V	HELIPOT	66WR50K	232705030
R88	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131
R89	3.3M	1/2W	10%		AB	TYPE EB	200203356
R90	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
U1	14PDIL				T.I.	UA709MJ	500007092
U2	TO99	500MW			ANALOG	AD3237	500000741
U3	14DILP				RCA	CA3045	500030450
U4	TO-5	450MW			RCA	CA3039	500030390
U5	10P	TO5			FAIRCHILD	726HC	500007260

Table 8—15. Temperature Compensation Network Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR1	DO35 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
CR2	DO35 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
R1	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131

Table 8—16. Logarithmic Converter (Card 14) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1-2	1000PF	Z5RTC	10%	1KV	CENTRALAB	DD-102	330001020
C3-5	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
CR1-3	DO35 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
K1-3	500-	29MW		5V	ELECTROL	RA-3038-1051	602500100
L1	1MH		50		DELEVAN	2500-28	450300900
R1-2	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R3	243K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221024331
R4	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R5	200K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220220031
R6	10K	.75W	10%		HELIPOT	89PR10K	232501030
R7	200K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220220031
R8	1000-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210011
R9	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R10	100K	.75W	10%		HELIPOT	89PR100K	232501040
R11	562K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220256231
R12	1820-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220218211
R13	46.4K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221046421
R14	20K	.75W	10%		HELIPOT	89PR20K	232502030
R15	1.91K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221019111
R16	10K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221010021
R17	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021

Table 8—16. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R18	10K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221010021
R19	47-	1/4W	10%		AB	TYPE CB	200104706
R20	18.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220218721
R21	5K	.75W	10		HELIPOT	89PR5K	232505020
R22	39.2K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221039221
R23	5K	.75W	10		HELIPOT	89PR5K	232505020
R24	39.2K	1/8W	1%		IRC	RN55 SIZE 25 PPM	221039221
R25	5K	.75W	10		HELIPOT	89PR5K	232505020
R26	10K	1/4W	10%		AB	TYPE CB	200101036
R27	470-	1/4W	10%		AB	TYPE CB	200104716
U1	10P	T05			FAIRCHILD	726HC	500007260
U2	8P T099				FAIRCHILD	UA741EHC	500007414
U3	10P	T05			FAIRCHILD	726HC	500007260
U4	T099	500MW			ANALOG	AD3237	500000741
U5	8P T099				FAIRCHILD	UA741EHC	500007414
U6	14DIP-P			TTL	TI	SN7401N	510074010
U7	8DIP-P			DS	TI	SN75451BP	510075451

Table 8—17. A/D Converter (Card 15) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.005UF		20%	50V	CENTRALAB	CK-502	330705020
C2	220PF	Z5FTC	10%	1KV	CENTRALAB	DD-221	330002210
C3	1.5UF		20%	50V	F-DYNE	MPE12-1.5-50-20	321901550
C4	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C5	100PF	S3NTC	10%	1KV	CENTRALAB	DD-101	330001010
C6	150PF	S3NTC	10%	1KV	CENTRALAB	DD-151	330001510
C7	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C8	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C9	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C10	.6UF		10%	100V	F-DYNE	MPE11-.6-100-10	321906040
C11	150PF	S3NTC	10%	1KV	CENTRALAB	DD-151	330001510
C12	150PF	S3NTC	10%	1KV	CENTRALAB	DD-151	330001510
C13	1000PF	Z5RTC	10%	1KV	CENTRALAB	DD-102	330001020
C14	200PF	S3NTC	10%	1KV	CENTRALAB	DD-201	330002010
CR1	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR2	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR3	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR4	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR5	D07	.25W	5%	6.2V	DICKSON	1N823	563008230
CR6	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR9	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
K1	RELAY						A008610122
Q1	T092	310MW TA	P	40V	MOTOROLA	MPF152 2N5461	555001520
Q2	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q3	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q4	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q5	T092	310MW TA	P	40V	MOTOROLA	MPF152 2N5461	555001520
Q6	T092	310MW TA	P	40V	MOTOROLA	MPF152 2N5461	555001520
Q7	T092	310MW TA	P	40V	MOTOROLA	MPF152 2N5461	555001520
Q8-10	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
R1	61.9K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220261921
R2	100K	1/4W	10%		AB	TYPE CB	200101046

Table 8—17. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R3	100K	1/4W	10%		AB	TYPE CB	200101046
R4	10K	1/4W	10%		AB	TYPE CB	200101036
R5	100K	1/4W	10%		AB	TYPE CB	200101046
R6	100K	1/4W	10%		AB	TYPE CB	200101046
R7	10K	1/4W	10%		AB	TYPE CB	200101036
R8	10K	1/4W	10%		AB	TYPE CB	200101036
R9	1.5K	1/4W	10%		AB	TYPE CB	200101526
R10	10K	1/4W	10%		AB	TYPE CB	200101036
R11	100K	1/4W	10%		AB	TYPE CB	200101046
R12	40.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220240221
R13	2K	.75W	10%		HELIPOT	89PR2K	232502020
R14	100K	1/4W	10%		AB	TYPE CB	200101046
R15	40.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220240221
R16	2K	.75W	10%		HELIPOT	89PR2K	232502020
R17	10K	1/4W	10%		AB	TYPE CB	200101036
R18	1.2K	1/4W	10%		AB	TYPE CB	200101226
R19	10K	1/4W	10%		AB	TYPE CB	200101036
R20	100K	1/4W	10%		AB	TYPE CB	200101046
R21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	10K	1/4W	10%		AB	TYPE CB	200101036
R23	6.8K	1/4W	10%		AB	TYPE CB	200106826
R24	1620-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216211
R25	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R27	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R28	49.9K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220249921
R29	560-	1/4W	10%		AB	TYPE CB	200105616
R30	100K	1/4W	10%		AB	TYPE CB	200101046
R31	2.7K	1/4W	10%		AB	TYPE CB	200102726
R32	50K	.75W	10		HELIPOT	89PR50K	232505030
R33	1M	1/4W	10%		AB	TYPE CB	200101056
R34	100K	1/4W	10%		AB	TYPE CB	200101046
R36	4.7K	1/4W	10%		AB	TYPE CB	200104726
R37	10K	1/4W	10%		AB	TYPE CB	200101036
R38	47K	1/4W	10%		AB	TYPE CB	200104736
R39	68-	1/4W	10%		AB	TYPE CB	200106806
R40	12K	1/4W	10%		AB	TYPE CB	200101236
R41	56-	1/4W	10%		AB	TYPE CB	200105606
R42	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131
R43	121K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212131
R44	4.7K	1/4W	10%		AB	TYPE CB	200104726
R45	470-	1/4W	10%		AB	TYPE CB	200104716
R12A	470K	1/4W	10%		AB	TYPE CB	200104746
U1	14DIP-P			UTL	SIGNETICS	SP370A	510003700
U2	16DIP-P			TTL	TI	SN7476N	510074760
U3	14DIP-P			TTL	TI	SN7401N	510074010
U4	14DILP				TI	SN72709N	500007090
U5	CI, DUAL COMPARATOR,TO-5				NAT. SEMI	LM211H	500002111
U6	14DILP				FAIRCHILD	741PC	500007410
U7	CI, DUAL COMPARATOR,TO-5				NAT. SEMI	LM211H	500002111
15A	470K	1/4W	10%		AB	TYPE CB	200104746
15A35	470K	1/4W	10%		AB	TYPE CB	200104746

Table 8—18. Counter (Card 16) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C3	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C4	39PF		5%	500V	ELMENCO	CM15-E390J	335003900
C5	.01UF		20%	16V	CENTRALAB	UK16-103	330701031
C6	.01UF		20%	16V	CENTRALAB	UK16-103	330701031
Q1	TO92	350MW TC PNP		25V	MOTOROLA	MPS6519	552065190
R1	15K	1/4W	10%		AB	TYPE CB	200101536
R2	4.7K	1/4W	10%		AB	TYPE CB	200104726
R3	1K	1/4W	10%		AB	TYPE CB	200101026
R4	3.9K	1/4W	10%		AB	TYPE CB	200103926
R5	4.7K	1/4W	10%		AB	TYPE CB	200104726
R6	2.2K	1/4W	10%		AB	TYPE CB	200102226
R7	1K	1/4W	10%		AB	TYPE CB	200101026
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	4.7K	1/4W	10%		AB	TYPE CB	200104726
R10	4.7K	1/4W	10%		AB	TYPE CB	200104726
R11	4.7K	1/4W	10%		AB	TYPE CB	200104726
S1		1/2A		28V	CONTROL SW	T8201	620402400
U1	14DIP-P			TTL	TI	SN7490AN	510074900
U2	14DIP-P			TTL	TI	SN7490AN	510074900
U3	14DIP-P			TTL	TI	SN7490AN	510074900
U4	14DIP-P			TTL	TI	SN7401N	510074010
U5	14DIP-P			TTL	TI	SN7402N	510074020
U6	14DIP-P			TTL	T.I.	SN74196N	510074196
U7	14DIP-P			TTL	TI	SN74121N	510074121
U8	14DIP-P			TTL	TI	SN7473N	510074730
U9	14DIP-P			TTL	TI	SN74121N	510074121
U10	14DIP-P			TTL	TI	SN7402N	510074020
U11	14DIP-P			TTL	TI	SN7401N	510074010
U12	14DIP-P			TTL	TI	SN7401N	510074010

Table 8—19. Time Base (Card 17) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	47PF	S2LTC	10%	1KV	CENTRALAB	DD-470	330004700
C2	100PF		5%	500V	ELMENCO	CM15-E101J	335001010
C3	130PF		5%	500V	ELMENCO	CM15-E131J	335001310
C4	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C5	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
C6	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
Q1	TO-92	350MW TA NPN		25V	MOTOROLA	MPS6515	550065150
Q2	TO-92	350MW TA NPN		25V	MOTOROLA	MPS6515	550065150
Q3	TO-92	350MW TA NPN		40V	MOTOROLA	2N3903	550039030
Q4	TO-92	350MW TA NPN		40V	MOTOROLA	2N3903	550039030
R1	4.7K	1/4W	10%		AB	TYPE CB	200104726
R2	4.7K	1/4W	10%		AB	TYPE CB	200104726
R3	4.7K	1/4W	10%		AB	TYPE CB	200104726
R4	220K	1/4W	10%		AB	TYPE CB	200102246
R5	6.8K	1/4W	10%		AB	TYPE CB	200106826
R6	470-	1/4W	10%		AB	TYPE CB	200104716

Table 8—19. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R14-29	4.7K	1/4W	10%		AB	TYPE CB	200104726
R30	8.2K	1/4W	10%		AB	TYPE CB	200108226
R31	8.2K	1/4W	10%		AB	TYPE CB	200108226
R32	1K	1/4W	10%		AB	TYPE CB	200101026
U1	14DIP-P			TTL	TI	SN7473N	510074730
U2	14DIP-P			TTL	TI	SN7490AN	510074900
U3	14DIP-P			TTL	TI	SN7490AN	510074900
U4	14DIP-P			TTL	TI	SN7490AN	510074900
U5	14DIP-P			TTL	TI	SN7490AN	510074900
U6	14DIP-P			TTL	TI	SN7490AN	510074900
U7	14DIP-P			TTL	TI	SN7490AN	510074900
U8	14DIP-P			TTL	TI	SN7401N	510074010
U9	14DIP-P			TTL	TI	SN7401N	510074010
U10	14DIP-P			TTL	TI	SN7401N	510074010
U11	14DIP-P			TTL	TI	SN7401N	510074010
Y1	1MHZ		005		CRYSTEK	HC-6	919100300

Table 8—20. Output Buffer (Card 18) Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	4.7UF	B	20%	35V	SPRAGUE	196D475X0035JA1	310804750
R1-20	470-	1/4W	10%		AB	TYPE CB	200104716
R21	1K	1/4W	10%		AB	TYPE CB	200101026
R22	8.2K	1/4W	10%		AB	TYPE CB	200108226
U1	8DIP-P			DS	TI	SN75451BP	510075451
U2	8DIP-P			DS	TI	SN75451BP	510075451
U3	8DIP-P			DS	TI	SN75451BP	510075451
U4	8DIP-P			DS	TI	SN75451BP	510075451
U5	8DIP-P			DS	TI	SN75451BP	510075451
U6	8DIP-P			DS	TI	SN75451BP	510075451
U7	8DIP-P			DS	TI	SN75451BP	510075451
U8	8DIP-P			DS	TI	SN75451BP	510075451
U9	8DIP-P			DS	TI	SN75451BP	510075451
U10	8DIP-P			DS	TI	SN75451BP	510075451
U11	8DIP-P			DS	TI	SN75451BP	510075451

Table 8—21. External Recorder Buffer (Card 19) Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	22UF 20% 25V	SPRAGUE	196D226X0025LA3	310802261
R1	4.7K 1/4W 10%	01121	TYPE CB	200104726
R2	SAME AS R1			
R3	SAME AS R1			
R4	SAME AS R1			
R5	SAME AS R1			
R6	SAME AS R1			
R7	SAME AS R1			
R8	SAME AS R1			
R9	SAME AS R1			
R10	SAME AS R1			
R11	SAME AS R1			
R12	SAME AS R1			
R13	SAME AS R1			
R14	SAME AS R1			
R15	SAME AS R1			
R16	SAME AS R1			
R17	SAME AS R1			
R18	SAME AS R1			
R19	SAME AS R1			
R20	SAME AS R1			
U1	14DILP 00	01295	SN7401N	510074010
U2	SAME AS U1			
U3	SAME AS U1			
U4	SAME AS U1			
U5	SAME AS U1			

Table 8—22. Scan Lamp Display Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR1-8	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
DS1		20MA		5V	SHELLY	BEPH-210-WDL	726000100
DS2		20MA		5V	SHELLY	BEPH-210-WDL	726000200
DS3		20MA		5V	SHELLY	BEPH-210-WDL	726000300
DS4		20MA		5V	SHELLY	BEPH-210-WDL	726000400
DS5		20MA		5V	SHELLY	BEPH-210-WDL	726000500
DS6		20MA		5V	SHELLY	BEPH-210-WDL	726000600
DS7		20MA		5V	SHELLY	BEPH-210-WDL	726000700
DS8		20MA		5V	SHELLY	BEPH-210 WDL	726000800
J21	TYPE 1A 10 DUAL MIL BLWS				AMPHENOL	225-21021-101	651700300
Q1-8	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
R1-8	100K	1/2W 10%			AB	TYPE EB	200201046
R9-16	10K	1/2W 10%			AB	TYPE EB	200201036

Table 8—23. Impedance Equalizer Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R1	90.9K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220290921
R2	26.1-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220226191
R3	26.1-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220226191

Table 8—24. J18 Patch Plug Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
P18	38PIN				ELCO	8016-038-000-701	653202200

Table 8—25. Model 8620 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C6	1000UF			25V	SPRAGUE	39D108G025GL4	300001080
C7	100UF			25V	SPRAGUE	TE1211	300201073
C8	100UF			16V	SPRAGUE	TE-1162	300201071
C22-23	1.0UF	Y5V	TC 20%	100V	ERIE	8141-100-651-105M	330801051
C24	.1UF		00	75V	CENTRALAB	DDA-104	330201040
CR1	DO4	12A	SI	400V	GE	1N1204A	560012041
CR2-5	120	IFM12A		50V	G.E.	A-28F	560002800
CR6	A1 200NS 1A		SI	.1MA	MOTOROLA	1N4933	560049330
CR7	A1 200NS 1A		SI	.1MA	MOTOROLA	1N4933	560049330
F1		10A		32V	LITELFUSE	3AG	863102200
F2		5A		250V	LITTELFUSE	3AG	863100900
F3-5		.5A		250V	LITTELFUSE	3AG	863100300
Q3	TO-3	115W	TC NPN	60V	RCA	2N3055	550030550
TP7	TIEPOINT,SINGLE				CINCH	51	836400100
TS1	3 CONTACT				CINCH	3-140 3/4W	850000200
TS2	2 CONTACT				CINCH	2-140Y	850002900
XF1-5	FUSEHOLDER,3AG PANEL				BUSSMAN	HKP	863000100

Table 8—26. CB-1 Filter Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C2	50UF			150V	SPRAGUE	39D506F150FJ4	300005062
C3	50UF			150V	SPRAGUE	39D506F150FJ4	300005062
C17	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C18	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C19	10UF			150V	SPRAGUE	TE1507	300201062
C20	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C21	.1UF		00	75V	CENTRALAB	DDA-104	330201040
L1	3.35UH	13A	20		MILLER	5218	450500100
L9	3.35UH	13A	20		MILLER	5218	450500100

Table 8—27. CB-2 Filter Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C4-5	4000UF			25V	SPRAGUE	39D408G025JS4	300004080
L2	3.35UH	13A	20		MILLER	5218	450500100

Table 8—28. Switching Transistor Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR8	A1 200NS 1A SI			.1MA	MOTOROLA	1N4933	560049330
CR9	A1 200NS 1A SI			.1MA	MOTOROLA	1N4933	560049330
CR10	A1 200NS 1A SI			.1MA	MOTOROLA	1N4937	560049370
CR11	A1 200NS 1A SI			.1MA	MOTOROLA	1N4937	560049370
CR12	A1EE	5W	10%	130V	MOTOROLA	1N5381A	562053811
CR13	A1 200NS 1A SI			.1MA	MOTOROLA	1N4933	560049330
CR14	A1 200NS 1A SI			.1MA	MOTOROLA	1N4933	560049330
L3	CORE TOROID TAPE WOUND				ARNOLD ENG	3T5340-S1	490101000
R1	SEL VAL	5W	5%		W LEONARD	TYPE 5XM	210400000
R2	SEL VAL	5W	5%		W LEONARD	TYPE 5XM	210400000
R3	2.5K	3W	5%		W LEONARD	TYPE 3X	210302525
R4	10-	3W	5%		W LEONARD	TYPE 3X	210301005
R5	10-	3W	5%		W LEONARD	TYPE 3X	210301005

Table 8—29. Output Module Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C9-10	.47UF	Y5V TC	20%	50V	ERIE	8131-050-651-474M	330804740
C11	.1UF		20%	500V	SPRAGUE	5GA-P10	330401040
C12-15	100UF			16V	SPRAGUE	TE-1162	300201071
C16	20UF			350V	SPRAGUE	39D206F350FL4	300002060
L4	50MHZ		20		FERROXCUBE	VK200-10/3B	450600100
L5	INDUCTOR ASSY						A008620021
L5-6	INDUCTOR ASSY						A008620021
L6	INDUCTOR ASSY						A008620021
L7-8	50MHZ		20		FERROXCUBE	VK200-10/3B	450600100
TB2	TERMINAL BD						A008620118

Table 8—30. PC Board E95957 Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1-4	100UF			25V	SPRAGUE	TE1211	300201073
C5	100UF			16V	SPRAGUE	TE-1162	300201071
C6	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C7	5000PF	Z5UTC	GMV	1KV	CENTRALAB	DD-502	330005020
C8	200PF	S3NTC	10%	1KV	CENTRALAB	DD-201	330002010
C9-10	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C11	200PF	S3NTC	10%	1KV	CENTRALAB	DD-201	330002010
C12	100UF			16V	SPRAGUE	TE-1162	300201071
C13-14	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C15	200PF	S3NTC	10%	1KV	CENTRALAB	DD-201	330002010
C16	100UF			16V	SPRAGUE	TE-1162	300201071
C17	.1UF		00	75V	CENTRALAB	DDA-104	330201040
C18	50UF			300V	SPRAGUE	39D506F300GL4	300005060
C19	.1UF		20%	500V	SPRAGUE	5GA-P10	330401040
C20-21	100UF			25V	SPRAGUE	TE1211	300201073
CR1	A1	200NS 1A	SI	.1MA	MOTOROLA	1N4933	560049330
CR2	A1	400MW	5%	5.6V	DICKSON	1N752A	562007520
CR3	DO41	1A	SI	200V	EDAL	1N4003	560040030
CR4	DO7	.25W	5%	6.2V	DICKSON	1N823	563008230
CR5-8	A1	200NS 1A	SI	.1MA	MOTOROLA	1N4937	560049370
CR9-12	DO35	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR13-15	A1	200NS 1A	SI	.1MA	MOTOROLA	1N4933	560049330
CR16	DO7	250MW	5%	24V	DICKSON	1N709A	562007091
Q1	CASE5	7A		200V	RCA	40654	556040654
Q2	TO-5	1W TA	NPN	40V	RCA	2N3053	550030530
Q3	TO92	350MW TC	PNP	25V	MOTOROLA	MPS6519	552065190
Q4	TO66W/HS	5.8WTA	NPN	55V	RCA	40372	550040372
Q5	TO-92	350MW TA	NPN	25V	MOTOROLA	MPS6515	550065150
Q6	TO66W/HS	5.8WTA	NPN	55V	RCA	40372	550040372
R1-2	5-	2W	5%		W LEONARD	TYPE 2X	210205095
R3-4	1K	1/2W	10%		AB	TYPE EB	200201026
R5	220-	1/2W	10%		AB	TYPE EB	200202216
R7	1.5K	1/2W	10%		AB	TYPE EB	200201526
R8	220-	1/2W	10%		AB	TYPE EB	200202216
R9	2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220220011
R10	1K	.75W	10%		HELIPOT	89PR1K	232501020
R11	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R12	1K	.75W	10%		HELIPOT	89PR1K	232501020
R13	11K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211021
R14	1.5K	1/2W	10%		AB	TYPE EB	200201526
R15	82-	1/2W	5%		AB	TYPE EB	200208205
R16	13.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220213321
R17	2K	.75W	10%		HELIPOT	89PR2K	232502020
R18	4870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220248711
R19	1.5K	1/2W	10%		AB	TYPE EB	200201526
R20	82-	1/2W	5%		AB	TYPE EB	200208205
R21	150K	1/2W	5%		AB	TYPE EB	200201545
R22	560-	1/2W	10%		AB	TYPE EB	200205616
R23	4.7K	1/2W	10%		AB	TYPE EB	200204726
U1-3	14PDIL				T.I.	UA709MJ	500007092

Table 8—31. Model 8630 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
DS1		20MA		5V	SHELLEY	BEPH-210-GSL	726001800
DS2		19MA		5V	SHELLEY	BEPH-210-RSL	726001900
J1	38PIN				ELCO	8016-038-000 707	653201100
Q13	TO-66	25W TC NPN		55V	RCA	2N3054	550030540
W1	8630 HARNESS						A008630013

Table 8—32. Model 8630 Readout Board Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C2-3	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1	A-140	1W	1%	6.4V	SCHAUER	SZ6.4	562000640
CR2-17	D035 4NS 10MA		SI	50UA	FAIRCHILD	1N4148	560041480
DS1-3		20MA		5V	CHICAGO	6022	730002300
DS4	NIXI DIGITAL DISPLAY				NAT ELECT	NL967	720200300
DS5-8	NIXI DIGITAL DISPLAY				NAT ELECT	NL807	720200400
J1	TYPE 1F 15 DUAL MIL BLWS				AMPHENOL	225-21521-110	651700700
Q1	TO-39	5W		300V	RCA	40327	550040327
Q2	TO105 300MW TC PNP			25V	CDC	2N3638	552036380
Q3	TO-39	5W		300V	RCA	40327	550040327
Q4	TO105 300MW TC PNP			25V	CDC	2N3638	552036380
Q5-12	TO-39	5W		300V	RCA	40327	550040327
Q14	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
Q15	TO92 350MW TC PNP			40V	MOTOROLA	2N3905	552039050
Q16	TO-92 350MW TA NPN			25V	MOTOROLA	MPS6515	550065150
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	4.7K	1/4W	10%		AB	TYPE CB	200104726
R3	1K	1/4W	10%		AB	TYPE CB	200101026
R4	390-	1/4W	10%		AB	TYPE CB	200103916
R5	470-	1/4W	10%		AB	TYPE CB	200104716
R6	390-	1/4W	10%		AB	TYPE CB	200103916
R7	470-	1/4W	10%		AB	TYPE CB	200104716
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	18K	1W	5%		VARIOUS	RL-20	200301835
R10	330K	1/4W	10%		AB	TYPE CB	200103346
R11	100K	1/4W	10%		AB	TYPE CB	200101046
R12	18K	1W	5%		VARIOUS	RL-20	200301835
R13	330K	1/4W	10%		AB	TYPE CB	200103346
R14	100K	1/4W	10%		AB	TYPE CB	200101046
R15	18K	1W	5%		VARIOUS	RL-20	200301835
R16	330K	1/4W	10%		AB	TYPE CB	200103346
R17	100K	1/4W	10%		AB	TYPE CB	200101046
R18	18K	1W	5%		VARIOUS	RL-20	200301835
R19	330K	1/4W	10%		AB	TYPE CB	200103346
R20	100K	1/4W	10%		AB	TYPE CB	200101046
R21-22	22K	1/4W	10%		AB	TYPE CB	200102236
R23	1K	1/4W	10%		AB	TYPE CB	200101026
R24-25	22K	1/4W	10%		AB	TYPE CB	200102236
R26	33K	1/2W	10%		AB	TYPE EB	200203336

Table 8—32. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
R27-28	1K	1/4W	10%		AB	TYPE CB	200101026
R29	470-	1/4W	10%		AB	TYPE CB	200104716
R30	22K	1/4W	10%		AB	TYPE CB	200102236
R31	10K	1/4W	10%		AB	TYPE CB	200101036
R32	100K	1/4W	10%		AB	TYPE CB	200101046
R33	4.7K	1/4W	10%		AB	TYPE CB	200104726
U1-4	16DIP-P			TTL	TI	SN74141N	510074141
U5-10	16DIP-P			TTL	TI	SN7475N	510074750
U11	8DIP-P			DS	TI	SN75451BP	510075451

Table 8—33. Model 8630 Decoder Board Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR1-15	DO35 4NS 10MA	SI		50UA	FAIRCHILD	1N4148	560041480
Q1-5	TO-92 350MW TA	NPN		25V	MOTOROLA	MPS6515	550065150
R1-2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	10K	1/4W	10%		AB	TYPE CB	200101036
R4	4.7K	1/4W	10%		AB	TYPE CB	200104726
R5-6	10K	1/4W	10%		AB	TYPE CB	200101036
R7-8	4.7K	1/4W	10%		AB	TYPE CB	200104726
R9-10	10K	1/4W	10%		AB	TYPE CB	200101036
R11	4.7K	1/4W	10%		AB	TYPE CB	200104726
R12	1K	1/4W	10%		AB	TYPE CB	200101026
R13	4.7K	1/4W	10%		AB	TYPE CB	200104726
R14	100K	1/4W	10%		AB	TYPE CB	200101046
U1	24DIP-P			TTL	TI	SN74154N	510074154
U2	14DIP-P			TTL	TI	SN7400N	510074000
U3	14DIP-P			TTL	TI	SN7420N	510074200
U4	8DIP-P			DS	TI	SN75451BP	510075451
U5	8DIP-P			DS	TI	SN75451BP	510075451
U6	14DIP-P			TTL	TI	SN7407N	510074070

Table 8—34. Model 8631 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
DS1		20MA		5V	SHELLEY	BEPH-210-GSL	726001800
DS2		19MA		5V	SHELLEY	BEPH-210-RSL	726001900
J1	38PIN				ELCO	8016-038-000 707	653201100
J2	38PIN				ELCO	8016-038-000 707	653201100
Q13	TO-66	25W TC	NPN	55V	RCA	2N3054	550030540

Table 8—35. Model 8640 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
DS1		20MA		5V	SHELLEY	BEPH-210-GSL	726001800
DS2		19MA		5V	SHELLEY	BEPH-210-RSL	726001900
J1	38PIN				ELCO	8016-038-000 707	653201100
PC1	READOUT BOARD SUB ASSY						A008630010
PC2	DECODER A SUB ASSY						A008630011
PC3	FREQ DISP+INHIB SUB ASSY						A008640010
Q13	TO-66	25W TC NPN		55V	RCA	2N3054	550030540
W1	8630 HARNESS						A008630013
W2	8630 HARNESS						A008630013
1A	READOUT BOARD SUB ASSY						A008630010
13A	TO-66	25W TC NPN		55V	RCA	2N3054	550030540
2A	DECODER A SUB ASSY						A008630011

Table 8—36. Model 8640 Frequency Display and Inhibit, PC3 Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF	Y5V TC	20%	50V	ERIE	8121-050-651-104M	330801040
U1	14DIP-P				TTL TI	SN7440N	510074400
U2	14DIP-P				TTL TI	SN7400N	510074000

Table 8—37. Model 8650-CN Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF		00	75V	CENTRALAB	DDA-104	330201040
CR1	VARISTOR				A.E.	RY-56	565505600
CR2	D035 4NS 10MA	SI	50UA		FAIRCHILD	1N4148	560041480
J2	SPECIAL				SWCRFT	4J-1271	650401900
J3	FORMC SPECIAL				TRIMM	90CTN-31B MODIFIED	650401800
J4	20PIN				ELCO	8016-020-000-707	653201500
PC1	FUNCTION SELECTOR						A008650012
PC2	IMPEDANCE SELECTOR						A008650011
R1	4.7K	1/4W	10%		AB	TYPE CB	200104726
S6	DPDT	6A		125V	J-B-T	ST22N	620100600
S7	DPDT IND-ORG				SHADOW	ZF-FA200-2UEE	630702300
T1	P50 TO 600 S50K SPLIT				NESHAMINY	AF-672	400200100
TS1	STRIP,BARRIER,6 CONTACT				CINCH	6-140Y	850003000
TS2	2 CONTACT				CINCH	2-140Y	850002900

Table 8—38. Model 8650 Function Selector PC1 Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	250UF			150V	SPRAGUE	39D257F150HP4	300002571
C2	250UF			150V	SPRAGUE	39D257F150HP4	300002571
DS1-3		40MA		28V	CHICAGO	387	730001000
DS8		40MA		28V	CHICAGO	387	730001000
R1	10K	1/2W	10%		AB	TYPE EB	200201036
R2-10	750-	3W	5%		OHMITE	4418	210307515
R11-17	27-	1/2W	5%		AB	TYPE EB	200202705
S3	SW PBN LEVEL-NOISE FREQ						A008650016
S4	SW PBN NO LEGEND						A008650017
S5	SW PBN SCAN-STOP						A008650013

Table 8—39. Model 8650 Impedance Selector PC2 Parts List

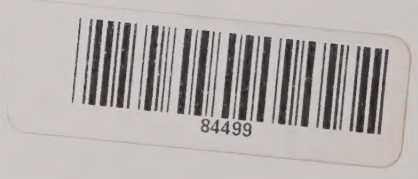
REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1A-2A	SELVAL		10%		SPRAGUE	225P	320000000
CR1	D041	1A	SI	200V	EDAL	1N4003	560040030
DS1-4		40MA		28V	CHICAGO	387	730001000
K1	RELAY						A008610116
R1-4	750-	3W	5%		OHMITE	4418	210307515
R7	200#	.25W			CTS	UPE200RE1-SW1442	231302010
R8	1K	.75W	10%		HELIPOT	89PR1K	232501020
R9-10	29.4K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220229421
R11	1K	.75W	10%		HELIPOT	89PR1K	232501020
R12	1K	.25W			CTS	UPE200RE1-SR9320	231301020
S1	SW PBN BRDG-TERM						A008650014
S2	SW PBN 600-900						A008650015

Table 8—40. Model 8651 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
C1	.1UF		00	75V	CENTRALAB	DDA-104	330201040
CR1	VARISTOR				A.E.	RY-56	565505600
CR2	D041	1A	SI	200V	EDAL	1N4003	560040030
CR3	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
J2	SPECIAL				SWCRFT	4J-1271	650401900
J3	FORMC	SPECIAL			TRIMM	90CTN-31B MODIFIED	650401800
J4-5	20PIN				ELCO	8016-020-000-707	653201500
R1	4.7K	1/4W	10%		AB	TYPE CB	200104726
S6	DPDT	6A		125V	J-B-T	ST22N	620100600
S7	DPDT	IND-ORG			SHADOW	ZF-FA200-2UEE	630702300
T1	P50 TO 600 S50K SPLIT				NESHAMINY	AF-672	400200100
TS1	STRIP,BARRIER,6 CONTACT				CINCH	6-140Y	850003000
TS2	2 CONTACT				CINCH	2-140Y	850002900
TS3	TIEPOINT,SINGLE				CINCH	51	836400100

Table 8—41. Model 8651 Relay Board Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E. PART NO.
CR1	D035	4NS 10MA	SI	50UA	FAIRCHILD	1N4148	560041480
CR2	D041	1A	SI	200V	EDAL	1N4003	560040030
K1	2C RELAY						A008651101
K2	2C RELAY						A008651101
K3	2C RELAY						A008651101
K4	2C RELAY						A008651101
Q1	TO92	625MW TA	PNP	80V	MOTOROLA	MPS A-56	552000560
Q2	TO-5	1W TA	NPN	65V	RCA	2N2102	550021020
R1	10K	1/4W	10%		AB	TYPE CB	200101036
R2	10K	1/4W	10%		AB	TYPE CB	200101036
R3	2.2K	1/4W	10%		AB	TYPE CB	200102226
R4	100K	1/4W	10%		AB	TYPE CB	200101046



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